

LEXINGTON COUNTY
LAND DEVELOPMENT MANUAL



LEXINGTON COUNTY
PUBLIC WORKS STORMWATER DIVISION

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REVISIONS

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CHAPTER 1 – GENERAL

1.1 Purpose

The purpose of the Land Development Manual is to establish minimum standards for design and construction of site grading and land development and re-development projects within the unincorporated areas of Lexington County and other municipalities as approved by the Lexington County Council. This document contains the policies and procedures used by the Lexington County Public Works Stormwater Division (PW/SWD) to interpret and implement the Lexington County Subdivision Regulations and the Storm Water Management Ordinance. The manual provides parameters and criteria for addressing some of the specific issues which must be resolved during the planning, designing, and construction phases of land development. The minimum standards for site and land development are intended to protect and promote the general welfare of all citizens by accomplishing these goals:

1. Clearly document the land disturbance permit application requirements and approval process;
2. Require the design and construction of safe and durable streets, right-of-ways, driveways and parking lots;
3. Require the design and construction of stormwater drainage systems that maintain to the maximum extent practicable a site's pre-development drainage characteristics in terms of flow rates, runoff volume, and pollutant load/concentrations;
4. Require complete and accurate designs and construction documents to ensure grading and property issues are addressed;
5. Require land disturbance projects to contain the necessary measures to control erosion and sediment during construction;
6. Require land disturbance projects to contain the necessary measures to reduce stormwater pollution and protect water quality through good design features, maintenance requirements, and encouragement of the latest stormwater treatment technologies (engineered devices) and approaches (e.g. Low Impact Development, or LID);
7. Provide general information on avenues to improve water quality, prevent illicit discharges, and minimize stormwater runoff impacts due to increased flow volumes, peak discharge rates, and pollutant loads from disturbed areas;
8. Prevent the alteration, diversions, or disturbance of watercourses that lie within a special flood hazard area without the prior approval from the Federal Emergency Management Agency through submittals of LOMRs, No-rise certifications, or other appropriate documentation. Development in the floodplain shall be discouraged until all other possible locations have been exhausted and a reasonable and

necessary use exists to develop in the floodplain. The PW/SWD shall be notified of any and all plans to develop areas within a floodplain;

9. Protect wetlands. All wetlands shall be delineated and verified by the US Army Corps of Engineers (USACE) and protected to the maximum extent possible or mitigated through other projects/mitigation banks. No disturbance of wetlands shall be allowed unless proper approval has been received from the USACE and Lexington County has been notified of such approval. Disturbance includes, but is not limited to, draining, grading, filling, discharging untreated stormwater runoff, and removal of vegetation.

In the sections below, the minimum standards and other submittal information required to obtain a land disturbance permit is provided. In developments where they are fully complied with (that is, no deviations are required), the review process can be completed in a relatively straightforward manner, often with no questions asked nor any additional information requested; in developments where deviations/exceptions are required, the submitting developer/engineer should include rationale/justification to support the desired changes. Proposed deviations from the standards will be considered on a case by case basis.

It must be recognized that some tracts of land are simply not economically feasible for certain types of development. In other cases, certain types of development may be economically feasible, but prohibited by ordinance measures such as restrictive zoning districts and road classification, or the 100-year floodway designations. Therefore, coordination with County staff is encouraged during the initial concept and planning stages of a development, before significant resources are committed privately. Pre-submittal meetings are required with our offices for that purpose. It is Lexington County's desire to provide safe, adequate, maintainable, and attractive infrastructure essential for the planned development within our borders.

Every effort has been made to cover the common conditions and information needed by those involved in land development activities, however, the requirements in this Manual and the County Ordinances should be reviewed carefully to ensure that all requirements are being met. In the event of a conflict, the Stormwater Management Ordinance and Land Development Manual govern in areas related to stormwater and protection of citizens from changes in stormwater due to the impacts of development. The Subdivision Regulations shall govern over conflicts related to the subdivision of property. If the Stormwater Management Ordinance, Land Development Manual, or Subdivision Regulations fail to resolve all conflicts, the PW/SWD has the authority to settle any such issues related to stormwater management.

1.2 Scope

The scope of the Land Development Manual is limited to the requirements for submitting site plans and related projects to the PW/SWD. The PW/SWD is only one part of the Lexington County review process, as is explained further in Chapter 2. State and federal agencies may have additional requirements other than those listed. The Land Development Manual is not intended as a textbook or a comprehensive engineering design reference. Site plans, details, calculations, construction specifications, and other technical documents must be designed and sealed by a

professional engineer or Tier B Land Surveyor, as appropriate, registered in the state of South Carolina, with sufficient knowledge and experience to accomplish all design elements of the site plan. Most types of engineering calculations are not explained or defined within the Land Development Manual, either due to the very complex nature of the subject matter or the fact that the design equations and methods are well-known to most competent practicing engineers who claim expertise in the area of land development. The Manual contains several references to some of the most common technical design manuals, such as the Natural Resources Conservation Service's (NRCS) TR-55 and South Carolina Department of Health and Environmental Control's (SCDHEC) BMP Manual, and where such information can be found.

In addition to technical design, submitted projects must also meet federal and state standards for health and safety. For instance, trenching and excavations must satisfy OSHA standards in 29 CFR 1926 Subpart P - Excavations. Scaffolding and temporary work platforms must also meet OSHA standards. Traffic signs must be designed to meet FHWA and AASHTO requirements unless otherwise specified in this manual. Consideration for public safety must be emphasized throughout the design process.

1.3 Description and Use of the Manual

The Manual is developed under the assumption that the user possesses a basic understanding of stormwater control design, construction, or land development depending on the user's particular area of expertise. The Manual provides those groups and others with required information for and proper formatting of application packages on proposed land disturbance activities in Lexington County. Users of this Manual who are not justly qualified by education or experience in the fields of stormwater control design, construction, or land development should consult with a qualified professional in one or more of these areas prior to planning for land disturbance activities.

This Manual is not intended to be a systematic design methodology that addresses every land development situation that may occur in Lexington County nor is it a detailed reference for the various methods and procedures used in the design process. The application of engineering principles and judgment combined with the information contained within this and other referenced material are necessary to successfully complete the planning, design, and preparation of documents for acquiring a land disturbance permit. References to guidance documents from federal, state, and local agencies are given throughout the Manual to provide additional information to users.

This Manual is not intended to restrain or inhibit engineering creativity, freedom of design, or the need for engineering judgment. When shown to be applicable, it is encouraged that new procedures, techniques, and innovative stormwater BMPs be submitted with supporting documentation. However the use of such approaches should be substantiated with submitted documentation by design professionals showing that the proposed design is equal to, or exceeds the traditional procedures in terms of performance and economic feasibility.

1.4 Manual Organization

The Manual contains six chapters, organized to present recommended technical and engineering procedures along with the criteria needed to comply with the State of South Carolina's Stormwater Management and Sediment Reduction Act, the NPDES Permit NO SCS030000, and Lexington County's Stormwater Management Ordinance. This chapter provides information on Lexington County's Authority to develop and enforce design requirements along with several legal matters, some background information on stormwater management and its importance, and definitions for terms used throughout the Manual. Chapter 2 describes the application process for obtaining a land disturbance permit. Chapter 3 contains specific water quantity and quality design criteria and the flood plain management requirements. Chapter 4 contains road design requirements. Chapter 5 describes the inspection and enforcement process. Chapter 6 contains references for designing components of the stormwater management system.

1.5 Authorization

This Manual has been prepared under the direction of the PW/SWD, which has been granted the authority to develop engineering design standards and enact programs and policies to ensure compliance with State and Federal laws for the purposes described above. A detailed description of the law, regulations, and assigned authorizations to Lexington County is provided below.

1.5.1 Stormwater Related Regulations and Permits

1.5.1.1 Clean Water Act

Federal Water Pollution Act, as amended by the Clean Water Act (CWA) requires the reduction of water pollution and gave EPA the congressional authority to develop programs to improve the health of navigable waters. EPA in response developed regulations that created a program of discharge permits as part of the National Pollutant Discharge Elimination System (NPDES) to regulate point source from a variety of discharges. The 1987 amendments to the CWA extended NPDES permits to industrial discharges, including stormwater runoff associated with land disturbing activity. The 1987 CWA Amendments also require NPDES permitting for stormwater runoff from urbanized areas. A municipal separate storm sewer system (MS4) NPDES permit is required based on population. Authority to administer the NPDES permit program was delegated to state agencies, such as SCDHEC, the EPA.

1.5.1.2 South Carolina Pollution Control Act

The South Carolina Pollution Control Act (PCA) S.C. was originally enacted in 1950 and was last amended in 1970 during the initial stages of the environmental movement. It was written very broadly and is applicable to essentially any activity that could negatively impact the environment by requiring attainment of a permit and implementation of measures to mitigate potential impacts.

1.5.1.3 South Carolina Stormwater Management and Sediment Reduction Act

The South Carolina Stormwater Management and Sediment Reduction Act of 1991 (SMSRA) S.C. Code Ann. §§ 48-14-10 et seq. was enacted to address the increase in stormwater runoff rate and quantity, the decrease of rainwater infiltration, and the increase in erosion associated with the extensive urban development that has been occurring throughout the state. Lexington County was authorized to implement the requirements of this Act and its associated regulations through delegated review, development and implementation of a Stormwater Management Program (SWMP), and other measures deemed necessary. The Act gave legislative authority to SCHEC to enact programs to meet its purpose. This authority has also been given to the local governments to administer the necessary steps to address stormwater impacts on waters of the State.

1.5.1.4 NPDES Permit for Stormwater Discharges Associated with Industrial Activity

All stormwater runoff from “industrial activities” is considered an illegal discharge without an NPDES Stormwater Permit (SCR100000). These permits require certain industries to develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which must include appropriate BMPs to minimize pollution to the receiving natural waterbodies. There are two general types of industrial activity permits: “construction related” and “other”. Coverage under the NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities is required for all construction sites that disturb one (1) or more acres of land. The requirements for obtaining and complying with this type of permit are the focus of this Manual.

1.5.1.5 NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (Permit No.: SCR030000)

Lexington County is required to have a National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater from the municipal separate storm sewer system (MS4). Because land disturbance activities contribute to the discharge of pollutants, the NPDES permit requires that Lexington County encourage, promote, and implement certain practices, programs, and procedures for the purpose of reducing or limiting discharge of pollutants to waters of the State. This permit was issued by SCDHEC in accordance with the provisions of the Stormwater Management and Sediment Reduction Act of South Carolina. The permit requires that Lexington County develop and implement a Stormwater Management Program to control the discharge of pollutants from its MS4 to the maximum extent practicable (MEP). The Stormwater Management Program has several components that must be met and this Manual provides partial compliance with several, including construction and post-construction management, and public education.

Note: As of the release date of this manual, it was unknown if Lexington County would be covered by this permit or an individual MS4 permit. The permit number above may change when Lexington County is covered by the NPDES permit. A copy of this permit is provided in Appendix C.

1.5.1.6 Lexington County ordinances, regulations, and standards

Lexington County has developed and adopted ordinances and standards, largely based on State and Federal regulations, specifically to address concerns associated with uncontrolled stormwater runoff. The principal ordinances and standards for the County that affect the land development selection of stormwater control measures are:

1. Stormwater Management Ordinance: Established the engineering design standards and land disturbance criteria for obtaining a land disturbance permit within Lexington County. The PW/SWD was authorized by this ordinance to develop all necessary regulations, as detailed in this Land Development Manual for properly controlling stormwater runoff and mitigating existing and future impacts;
2. Zoning Ordinance: Issues that may be impacted by this Ordinance when designing stormwater management systems include but are not limited to: limits on building density, buffer and setback requirements, parking lot islands and required spaces. Applicants should specifically check to make sure a desired development type is allowed in the planned location;
3. Landscape Ordinance: The Landscape Ordinance may affect stormwater management system designs through tree protection requirements, planting species selection, and screening requirements for ponds and other BMPs. This will typically be more crucial for commercial developments, however, all applicants are encouraged to contact the landscape Administrator for more information and specific requirements;
 - a. Lexington County Comprehensive Plan – Ordinance #99-1: This document is a compilation of the County’s land use planning goals and objectives. The plan covers all the previous policies adopted for the various planning areas of the County as well as the inclusion of new needs and issues which have arisen in recent years. These goals are changed by County Council through amendment of the ordinance at any regularly scheduled meeting with the Department of Planning and Development responsible for maintaining the current status of these strategies. The goals and objectives cover protection from flooding, protection of water quality, safe and efficient transportation facilities, airport investments, and many land use planning issues.
 - b. Subdivision Regulations: These regulations authored by the Planning Commission describe the process and procedures for the subdivision of property in Lexington County. These regulations are available on the County webpage, <http://www.lex-co.com>, for review.

This Manual has been prepared under the direction of the PW/SWD, which has been granted the authority to administer the stormwater management and sediment control plan review, approval/disapproval, and inspection by SCDHEC. By satisfying the requirements outlined in this Manual, the resulting design is expected to be in compliance with the provisions of the South Carolina Stormwater Management and Sediment Reduction Act of 1991.

Lexington County is required to comply with the NPDES General Permit for stormwater discharges.

Lexington County has been granted the authority to administer the stormwater management and sediment control plan review and approval/disapproval, and the inspections during construction and maintenance inspection components of the South Carolina Stormwater Management and Sediment Reduction Program to handle the following responsibilities:

1. Comply with all Federal and State regulatory requirements imposed by the NPDES Permit in accordance with the Clean Water Act to manage stormwater discharges from systems within Lexington County to waters of the state;
2. Conduct all activities necessary to carry out the stormwater management programs and other requirements included in the NPDES General Permit, SCS0000000, adopted on March 1st, 2006;
3. Maintain the stormwater system consistent with provisions of NPDES General Permit, and pursue the necessary means and resources required to fulfilling this responsibility;
4. Direct and oversee the continuous implementation and direct and ensure compliance with the NPDES General Permit.

1.6 Updates to the Design Manual

This Manual is intended to be a dynamic document. As design technology and criteria evolve or change or it becomes evident that additional measures are needed to ensure the public general welfare, the Manual will be updated as needed. Updates will always include oversight by process that involved a stakeholders group and other. This manual can also be found on the Lexington County website at <http://www.lex-co.com/Departments/publicworks/stormwater.html>.

1.7 Stormwater Management

Development has the potential to alter the natural drainage patterns, flow rates, and volumes of water in the environment. Development can directly or indirectly change the physical, chemical, and biological conditions of natural waterways. When land is developed, the natural hydrology of the watershed is disrupted. Traditional stormwater systems facilitated the efficient removal of not just runoff, but associated pollutants into receiving waters. Clearing removes vegetation that intercepts and slows rainfall runoff. Grading removes the benefits of topsoil, compacts the subsoil, and fills in depressions that provide natural storage. As a result of land development, infiltration is decreased and rainfall that once seeped into the ground runs off the surface at an accelerated rate.

In the following sections, further descriptions are provided on the impact of land development projects, and the measures that can be employed to mitigate such impacts.

1.7.1 Effects of Development on Watershed Hydrology

Development and urbanization have the following impacts on receiving waterbodies:

1. Changes to Stream Flow;
 - a. Increased runoff volumes;
 - b. Increased peak runoff discharges;
 - c. Greater runoff velocities;
 - d. Increased flooding frequency;
 - e. Lower dry weather flows (base flow);
2. Changes to Stream Geometry;
 - a. Stream channel enlargement and erosion;
 - b. Stream down cutting;
 - c. Changes in channel bed due to sedimentation;
 - d. Increase in floodplain elevation;
3. Degradation of Aquatic Habitat;
 - a. Degradation of habitat structure;
 - b. Decline in stream biological functions;
4. Water Quality Impacts;
 - a. Reduced oxygen in streams;
 - b. Microbial contamination;
 - c. Hydrocarbons and toxic materials;
 - d. Sedimentation;
5. Property Damage and Safety Concerns;
6. Unsightly Aesthetic Stream Channel Conditions and Restricted Use of Recreational Waters

1.7.2 Steps to Successful Stormwater Management Plans

Proper planning is necessary to ensure that stormwater management is considered and fully integrated at the various stages of the site-development process. This involves a comprehensive approach to site planning and a thorough understanding of the physical characteristics and resources associated with the project site. This planning includes addressing each of the following categories:

1. Storm water quantity controls;
2. Erosion and sediment control;
3. Storm water quality controls;
4. Storm water conveyance controls;
5. Maintenance schedules for construction and post construction activities.

The design of successful stormwater management plans involves adhering to the following principles, where applicable:

1. Pre-submittal site meeting/site visit;
2. Review of site development requirements;
3. Detailed site analysis and supporting calculations;
4. Creation of a Stormwater Concept Plan;
5. Design aspects of the stormwater management plans;
6. Approval and completion of the land disturbance permit application.

In Chapter 2, the procedure for submitting a complete land disturbance permit application is provided.

1.7.3 Innovative Design Approach

When designing for land disturbance activities, the design must address the following four categories of control: water quantity (flood control), design storm control (rate and volume), erosion prevention and sediment control, and pollution control (water quality standards, long-term). If an innovative stormwater design approach is to be used, the design professional should take the following considerations in mind, in addition to meeting these categories of control:

1. Stormwater quantity and quality are best controlled at the source of the problem by reducing the potential maximum amount of runoff and pollutants. Source control will typically be more economical in order to treat the first flush of a storm event

since a simple BMP for a large area will only treat the first flush from the closest portions of the site;

2. Best management practices (BMPs) implement stormwater management by using simple, structural and nonstructural methods along with or in place of traditional stormwater management structures when applicable;
3. Equaling or exceeding traditional stormwater management designs in terms of performance (rate/volume attenuation, pollutant removal) and economic feasibility (long-term) are essential to a proposed concept's eventual approval.

Innovative approaches to site design are more of a source control for stormwater runoff – the site design practices limit the amount of runoff generated as well as incorporate BMPs within the design for quantity and quality control. These types of design concepts are described in detail in several sources including: Georgia Stormwater Manual, Volume 1: Policy Guidebook, First Edition, Atlanta Regional Commission, August 2001; and, Low-Impact Development Design Manual, Prince George's County Maryland (1999a, 1999b). Some general concepts from these sources are provided in the following sections.

1.7.4 Best Management Practices and Site Planning Process

The first step in addressing stormwater management begins in the site planning and design stage of the development project. By implementing BMPs during the site planning process, the amount of runoff and pollutants generated from a site can be reduced by minimizing the amount of impervious area and utilizing natural on-site treatments. The minimizing of adverse stormwater runoff impacts by the use of BMPs and site planning should be a major consideration for a design professional.

The reduction of runoff volumes and stormwater pollutants reduces the total number and size of stormwater management controls that must be implemented under the guidelines set forth in this Manual. BMPs reduce the amount of total post-development impervious areas and maintain natural characteristics of the pre-development site conditions. Therefore, the post-development curve number and time of concentrations are maintained more closely to the pre-development conditions. This reduces the overall hydrologic and hydraulic impact of the development.

1.7.4.1 Maintaining site resources and natural undisturbed areas

Conservation of site resources and natural undisturbed areas helps to reduce the post development runoff volume and provide areas for natural stormwater management. Some natural site resources that should be maintained include, but are not limited to:

1. Natural drainageways;
2. Vegetated buffer areas along natural waterways;
3. Floodplains;

4. Areas of undisturbed vegetation;
5. Low areas within the site terrain;
6. Natural forested infiltration areas;
7. Wetlands.

1.7.4.2 Lower impact site layout techniques

Lower impact site layout techniques involve identifying and analyzing the location and configuration of structures on the site to be developed. Where applicable, the following options that create lower impacts layouts should be used:

1. Fit the design layout to follow the natural contours of the site to minimize clearing and grading and preserve natural drainage ways and patterns;
2. Limit the amount of clearing and grading by identifying the smallest possible area on the site that would require land disturbance;
3. Place development areas on the least sensitive areas of the site and avoid steeply sloped areas when possible;
4. Utilize nontraditional designs to reduce the overall imperviousness of the site by providing more undisturbed open space by minimizing clear-cutting;
5. Consider the utilization of cisterns and rain barrels to collect stormwater for reuse;
6. Level Spreader or other energy dissipation devices should be used at all discharge points. Level spreader should also be considered for discharge points into ponds and other basin-type BMPs.

1.7.4.3 Minimization of impervious cover

The minimization of total impervious area directly relates to a reduction in stormwater runoff volume and the associated pollutants from a development site. The amount of impervious cover on a site can be reduced by the following techniques where applicable:

1. Reduce building footprints by constructing some buildings as multi-story;
2. Reduce parking lot areas and use porous pavement surfaces for desired overflow parking where feasible;
3. Increase the amount of vegetated parking lot “islands” that can also be utilized for stormwater management practices such as Bioretention areas;
4. Disconnect impervious surfaces by directing runoff to adjacent pervious areas so that runoff can be filtered and infiltrated;

1.7.4.4 Utilization of natural features for stormwater management

Traditional stormwater drainage design does not utilize the natural drainage patterns of the site from the pre-developed state. Structural stormwater drainage controls are traditionally designed to quickly remove stormwater runoff from the site without utilizing any of the natural storage areas. These natural drainage areas should be considered as potential stormwater drainage systems. These natural areas can be utilized in the following ways where applicable:

1. Vegetated buffers and undisturbed areas on the site are useful to control sheet flow (not concentrated flows) by providing infiltration, runoff velocity reduction, and pollutant removal;
2. Various natural drainageways should be maintained and not disturbed to provide a natural stormwater drainage system to carry runoff to a natural outlet. The use of natural drainageways allows for more storage of stormwater runoff, lower peak flow rates, a reduction in erosive runoff velocities, and the capture and treatment of pollutants;
3. Use vegetated swales instead of curb and gutter applications where applicable. This application allows for more storage of stormwater runoff, lower peak flow rates, a reduction in erosive runoff velocities, and the capture and treatment of pollutants which does not occur with curb and gutter systems;
4. Where ditched roadways are not practical, curb and gutter systems may be combined with vegetated swales at outfalls to provide added water quality benefits versus the traditional piped outfall designs;
5. When applicable, direct rooftop runoff to pervious natural areas for water quality treatment and infiltration instead of connecting rooftop drains to roadways and other structural stormwater conveyance systems;
6. Consider the elimination of curb and gutter systems and utilize ditches, swales and other infiltration methods along roadways;

1.7.4.5 Engineered/proprietary devices

Lexington County is aware of the potential benefit in using a number of engineered devices currently available on the market, such as treatment devices such as baffle boxes, cartridge filters, bioretention, erosion control devices such as socks and tubes, and advanced vegetation producing methodologies. The PW/SWD will evaluate any and all such devices specified for a given product and require for each appropriate drawings, specifications, and discussions as to the applicability of the product, expected performance, and required maintenance. The PW/SWD reserves the right to request that certain devices be installed.

1.8 Engineering Design Accountability

The Land Development Manual will assist engineers, plan reviewers, inspectors, and contractors in the design and layout of most land disturbance projects. However, this manual does not replace or otherwise excuse the need for professional engineering judgment and knowledge. The user of this manual is hereby cautioned that many aspects of engineering design must be considered, including but not limited to:

1. Public health and safety;
2. Site-specific conditions or unusual features of project site that warrant special designs;
3. Current versions of design texts, manuals, technical documents and research.

The design engineer (with assistance from other design professionals as needed) is expected to thoroughly investigate field conditions and coordinate all design efforts with Lexington County. Construction plans must be stamped and signed by a professional engineer actively licensed in the state of South Carolina, unless otherwise stated in this Manual. The design professional must have sufficient education and experience to perform a complete and thorough design of each element shown on the construction plans, and must also have complete control to change or alter plans during the design phase. The professional's stamp is a public guarantee that his design has the highest regard for health and safety, protects the environment (air, soil, water) to the maximum degree possible, and serves the interests of the general public within Lexington County. Lexington County requires a certain level of design expertise for stormwater calculations and flooding analyses. Stormwater design criteria are based upon current scientific knowledge and engineering judgment. It should be realized by engineering designers that floods and flooding may occur at any time due to any number of factors beyond the reasonable control of the County, such as: greater amounts of precipitation or different rainfall patterns than used in design storms, wet soil conditions, debris or blockage of key stormwater channels, high groundwater tables, etc.

1.9 Legal Aspects

If any portion of the Land Development Manual is ruled to be invalid or unconstitutional by any court with adequate jurisdiction over Lexington County, then such portion shall be considered to have been selectively removed from this manual without affecting the manual's overall applicability and legal standing to the land disturbance process. The Land Development Manual will be revised on a periodic basis to reflect known changes to laws and regulations. All local, state and federal laws and regulations shall be considered when interpreting provisions within the Land Development Manual. In each instance, the more restrictive requirement shall govern unless sound engineering judgment can determine and prove that the more restrictive requirement would be otherwise unnecessary. In most instances, laws and regulations that are phrased more explicitly shall apply over those items that are not phrased as precisely.

1.10 Language and Interpretation of Text

The following language rules are applicable to the Land Development Manual:

1. The imperative case is always mandatory. The words “shall” and “must” are always mandatory. These actions must be performed unless sufficient engineering justification is submitted to County officials within the Stormwater Engineering Division and written approval has been specifically granted. The word “should” indicates an action that is highly recommended under most conditions. The word “may” indicates an allowable action or choice that is usually beneficial in meeting the minimum county requirements;
2. Use of the singular or plural case of a noun will not affect the applicability of this manual, or any other law, regulation, or ordinance, unless the context of the sentence specifically indicates that the singular/plural case affects the intended use or function on a scientific or engineering basis. The use of a singular or plural noun does not necessarily indicate whether to design or construct a single unit or multiple units;
3. Any reference to the PW/SWD shall mean the duly authorized representatives, sections or employees under the Director’s supervision who have the delegated responsibility. Areas of delegated responsibility may include, but is not limited to: review and approval of plans, review and approval of survey plats, definition of standards or requirements, approval of special conditions, review and issuance of permits, inspections and field investigations, enforcement actions, issuing notices of violation, conduct of public meetings, etc.
4. The use of “and” shall imply conjunction of items in lists of required elements, in which all items must be complied with. The use of “or” shall imply the disconnection of items in lists of required elements, in which either or one of the items in the list must be complied with.

1.11 Contact Information

The following Lexington County personnel should be contacted for any questions, clarifications, or other information not in this manual.

Primary contact for stormwater issues:

Public Works Director
440 Ballpark Road
Lexington, South Carolina 29072
(803) 785-8201

Stormwater Manager
440 Ballpark Road

Lexington, South Carolina 29072
(803) 785-8117

Environmental Coordinator
440 Ballpark Road
Lexington, South Carolina 29072
(803) 785-8634

Submittal address

Lexington County Community Development Department
212 South Lake Drive
Lexington, South Carolina 29072
(803) 785-8121
(803) 785-8188 (fax)
CDCustomerService@lex-co.com.

1.12 Definitions

Words used in this Manual shall have their customary meanings as determined by the standard dictionary definition except for the following specific words and terms which are herein defined or are otherwise defined in the Lexington County Stormwater Management Ordinance. In any case, the PW/SWD shall have the right to define or interpret any other word or term contained within this Manual. Definitions not included in the list below or in the Ordinance shall be as defined in authorizing regulations listed in Section 1.5 or in applicable FEMA regulations. The rules of verbal construction found in the Stormwater Management Ordinance apply to this Manual.

1. Accessory Structure; structures that are located on the same parcel of property as the principal structure and the use of which is incidental to the use of the principal structure. Garages, carports and storage sheds are common urban accessory structures. Pole barns, hay sheds and the like qualify as accessory structures on farms, and may or may not be located on the same parcel as the farm dwelling or shop building.
2. Addition (to an existing building): an extension or increase in the floor area or height of a building or structure. Additions to existing buildings shall comply with the requirements for new construction regardless as to whether the addition is a substantial improvement or not. Where a firewall or load-bearing wall is provided between the addition and the existing building, the addition(s) shall be considered a separate building and must comply with the standards for new construction.
3. Adverse impact: any modifications, alterations or effects on a feature or characteristics of community lands or waters which are or may potentially be harmful or injurious to human health, welfare, safety to property or which unreasonably interfere with the enjoyment of life or property. The term includes secondary and cumulative, as well as direct impacts.

4. Agricultural structure: a structure used solely for agricultural purposes in which the use is exclusively in connection with the production, harvesting, storage, drying, or raising of agricultural commodities, including the raising of livestock. Agricultural structures are not exempt from the provisions of this ordinance.
5. Area of shallow flooding: a designated AO or VO Zone on a community's Flood Insurance Rate Map (FIRM) with base flood depths of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and indeterminate, and where velocity flow may be evident.
6. Area of special flood hazard: the land in the floodplain within a community subject to a one percent or greater chance of being equaled or exceeded in any given year
7. As-Built: the set of construction drawings showing the final location and condition of all new or altered buildings, infrastructure and topography. As-built drawing must be submitted for all projects regulated by the PW/SWD. For the purposes of this manual, the term as-built shall be synonymous with record drawing.
8. Base Flood Elevation: the elevation of the flood having a one percent chance of being equaled or exceeded in any given year.
9. Basement: that portion of a building having its floor subgrade (below ground level) on all sides.
10. Building: (1) a relatively permanent enclosed construction over a plot of land, having a roof and usually windows and often more than one level, used for any of a wide variety of activities, as living, entertaining, or manufacturing; (2) anything built or constructed; (3) the act, business, or practice of constructing houses, office buildings, etc.
11. Critical development: development that is critical to the community's public health and safety, is essential to the orderly functioning of a community, is used to store or produce highly volatile, toxic or water-reactive materials, or house occupants that may be insufficiently mobile to avoid loss of life or injury. Examples of critical development include jails, hospitals, schools, fire stations, nursing homes, wastewater treatment facilities, water plants, certain manufacturing facilities, and gas/oil/propane storage facilities.
12. Culvert: enclosed symmetrical channel of comparatively short length installed to convey water from one side of an embankment to the other, typically under a roadway, and mainly used to divert stream or rainfall runoff to prevent erosion or flooding on highways.
13. Contour: an imaginary line, or its representation on a contour (topographic) map, joining points of equal elevation.
14. "Defined" Natural Drainage Channel: a natural drainage channel depicted on the Lexington County Soil Survey.

15. Detention: the collection and storage of stormwater runoff in a surface or sub-surface facility for subsequent controlled discharge to a watercourse or water body.
16. Development: the improvement of land or altering of the land use. This includes new development and re-development.
17. Ditch: a drainage channel in earth created by natural or artificial means to convey surface and/or subsurface water, flowing continuously or intermittently.
18. Drainage: a general term applied to the removal of surface or subsurface water from a given area either by gravity via natural means or by systems constructed so to remove water, and is commonly applied herein to surface water.
19. Drainage Facility: any component of the drainage system.
20. Drainage System: the surface and/or subsurface system which collects and conveys stormwater and surface water, and includes all watercourses, waterbodies, and wetlands.
21. Elevated building: a non-basement building built to have the lowest floor elevated above the ground level by means of fill, solid foundation perimeter walls, pilings, columns, piers, or shear walls parallel to the flow of water.
22. Elevation: height in feet above a given known datum, such as mean sea level.
23. Embankment or Fill: a deposit of soil, rock or other material placed by man.
24. Executive Order 11988 (Floodplain Management): Issued by President Carter in 1977, this order requires that no federally assisted activities be conducted in or have the potential to affect identified special flood hazard areas, unless there is no practicable alternative.
25. Existing construction: means, for the purposes of determining rates, structures for which the start of construction commenced before the effective date of the FIRM, or before January 1, 1975, for FIRMs effective before that date.
26. Expansion to an existing manufactured home park or subdivision: the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete slabs).
27. Flood: a temporary rise in the level of water which results in the inundation of areas not ordinarily covered by water.
 - a. Two (2) year flood: The flood having a fifty (50) percent chance of being equaled or exceeded in any given year.

- b. Five (5) year flood: The flood having a twenty (20) percent chance of being equaled or exceeded in any given year.
 - c. Ten (10) year flood: The flood having a ten (10) percent chance of being equaled or exceeded in any given year.
 - d. Twenty-five (25) year flood: The flood having a four (4) percent chance of being equaled or exceeded in any given year.
 - e. Fifty (50) year flood: The flood having a two (2) percent chance of being equaled or exceeded in any given year.
 - f. One hundred (100) year flood: The flood having a one (1) percent chance of being equaled or exceeded in any given year.
28. Flood Hazard Boundary Map (FHBM): an official map of a community, issued by the Federal Emergency Management Agency, where the boundaries of the areas of special flood hazard have been defined as Zone A Floodplain: any land area susceptible to being inundated by flood waters resulting from a flood with a return of 100 years or less.
 29. Flood Insurance Rate Map (FIRM) - an official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazard and the risk premium zones applicable to the community.
 30. Flood Insurance Study: the official report provided by the Federal Emergency Management Agency. The report contains flood profiles, as well as the Flood Boundary Floodway Map and the water surface elevation of the base flood.
 31. Flood-resistant material: any building material capable of withstanding direct and prolonged contact (minimum 72 hours) with floodwaters without sustaining damage that requires more than low-cost cosmetic repair. Any material that is water-soluble or is not resistant to alkali or acid in water, including normal adhesives for above-grade use, is not flood-resistant. Pressure-treated lumber or naturally decay-resistant lumbers are acceptable flooring materials. Sheet-type flooring coverings that restrict evaporation from below and materials that are impervious, but dimensionally unstable are not acceptable. Materials that absorb or retain water excessively after submergence are not flood-resistant. Please refer to Technical Bulletin 2-93, *Flood-Resistant Materials for Buildings Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program*, document number FIA-TB-2, dated 4/93, and available from the Federal Emergency Management Agency. Class 4 and 5 materials, referenced therein, are acceptable flood-resistant materials.
 32. Floodway: the channel of river or watercourse, and the adjacent land areas, that must be reserved in order to discharge a flood within a return frequency of 100 years without cumulatively increasing the water surface elevation more than one (1) foot.

33. Freeboard: a factor of safety usually expressed in feet above a flood level for purposes of flood plain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.
34. Functionally dependent facility: a facility which cannot be used for its intended purpose unless it is located or carried out in close proximity to water, such as a docking or port facility necessary for the loading and unloading of cargo or passengers, shipbuilding, ship repair, or seafood processing facilities. The term does not include long-term storage, manufacture, sales, or service facilities.
35. Grading: any displacement of soil by stripping, excavating, filling, stockpiling, or any combination thereof, including the land in its excavated or filled state.
36. Highest Adjacent Grade: the highest natural elevation of the ground surface, prior to construction, next to the proposed walls of the structure.
37. Historic Structure: any structure that is: (a) listed individually in the National Register of Historic Places (a listing maintained by the U.S. Department of the Interior (DOI)) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; (b) certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; (c) individually listed on a State inventory of historic places; (d) individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified (1) by an approved State program as determined by the Secretary of Interior, or (2) directly by the Secretary of Interior in states without approved programs. Some structures or districts listed on the State or local inventories MAY NOT be "Historic" as cited above, but have been included on the inventories because it was believed that the structures or districts have the potential for meeting the "Historic" structure criteria of the DOI. In order for these structures to meet NFIP historic structure criteria, it must be demonstrated and evidenced that the South Carolina Department of Archives and History has individually determined that the structure or district meets DOI historic structure criteria
38. Impervious surface: a surface which has been compacted or covered with a layer of material so that it is highly resistant to infiltration by water. The term includes most conventionally surfaced streets, roofs, sidewalks, parking lots, and other similar structures.
39. Increased Cost of Compliance (ICC): applies to all new and renewed flood insurance policies effective on and after June 1, 1997. The NFIP shall enable the purchase of insurance to cover the cost of compliance with land use and control measures established under Section 1361. It provides coverage for the payment of a claim to help pay for the cost to comply with State or community floodplain

management laws or ordinances after a flood event in which a building has been declared substantially or repetitively damaged.

40. Lexington County Inspector: any staff of the PW/SWD that is a Certified Erosion Prevention and Sediment Control Inspector (CEPSCI) or equal certification. CEPSCI is a program conducted by Clemson University Extension and approved by SCDHEC.
41. Limited storage: an area used for storage and intended to be limited to incidental items that can withstand exposure to the elements and have low flood damage potential. Such an area must be of flood resistant or breakaway material, void of utilities except for essential lighting and cannot be temperature controlled. If the area is located below the base flood elevation in an A, AE and A1-A30 zone it must meet the requirements of Article IV.A.4 of this ordinance. If the area is located below the base flood elevation in a V, VE and V1-V30 zone it must meet the requirements of Article IV.F of this ordinance.
42. Lowest Adjacent Grade (LAG): is an elevation of the lowest ground surface that touches any of the exterior walls of a building or proposed building walls.
43. Lowest Floor: the lowest floor of the lowest enclosed area. Any unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area is not considered a building's lowest floor provided that such an enclosure is not built so as to render the structure in violation of other provisions of this ordinance.
44. Manufactured home - a structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle".
45. Mean Sea Level: the average height of the sea for all stages of the tide. It is used as a reference for establishing various elevations within the floodplain. For purposes of this ordinance, the term is synonymous with National Geodetic Vertical Datum (NGVD).
46. National Geodetic Vertical Datum (NGVD): as corrected in 1929, elevation reference points set by National Geodetic Survey based on mean sea level.
47. North American Vertical Datum (NAVD): datum point established at Pointe-au-Père on the St. Lawrence River, Quebec Province, Canada, based on the mass or density of the earth. The datum listed as the reference datum on Flood Insurance Rate Maps should be used for Elevation Certificate and floodproofing certificate completion.
48. Non-erosive: a flow condition that does not cause erosion. Soil types and slopes should be considered in determining if a flow condition will cause erosion.

49. Outlet facility: stormwater management facility designed to regulate the elevation, rate, and volume of stormwater discharge from detention facilities.
50. Post-Development conditions: those conditions which are expected to exist, or do exist, after alteration, of the natural topography, vegetation, and rate, volume or direction of stormwater runoff, (resulting from development activity).
51. Pre-Development conditions: those conditions, in terms of the existing topography, vegetation and rate, volume or direction of stormwater runoff, which exist at the time the applicant submits an application form for a land disturbance permit or Waiver.
52. Project: improvements and structures proposed by the applicant to be constructed on a defined site as part of a common plan of development.
53. Proof-rolling: a form of quality control or compaction verification in "virgin-cut" areas; usually performed with a loaded dump truck.
54. Rate: volume of water passing a point per unit of times, generally expressed in cubic feet per second (cfs).
55. Recreational vehicle: a vehicle which is: (a) built on a single chassis; (b) 400 square feet or less when measured at the largest horizontal projection; (c) designed to be self-propelled or permanently towable by a light duty truck; and, (d) designed primarily not for use as a permanent dwelling, but as temporary living quarters for recreational, camping, travel, or seasonal use.
56. Re-development: any project such as expansion or addition that results in additional impervious area. Re-development projects greater than 5,000 ft² must be permitted.
57. Repetitive Loss: a building covered by a contract for flood insurance that has incurred flood-related damages on 2 occasions during a 10 year period ending on the date of the event for which a second claim is made, in which the cost of repairing the flood damage, on the average, equaled or exceeded 25% of the market value of the building at the time of each such flood event.
58. Retention: the collection and storage of stormwater runoff without subsequent discharge to surface waters.
59. Retrofit: the process of altering an existing drainage system to function properly or more efficiently that currently exists. Retrofitting will be a common method used by the County to address TMDLs (retrofitting systems to include a water quality/runoff treatment device).
60. Runoff: that part of rainfall that is not absorbed into the sites but flows over the site as surface waters.

61. Section 1316 of the National Flood insurance Act of 1968: The act provides that no new flood insurance shall be provided for any property found by the Federal Emergency Management Agency to have been declared by a state or local authority to be in violation of state or local ordinances.
62. Sediment: fine, particulate material, whether mineral or organic, that is in suspension and is being transported, or has been transported, from its site of origin by water or air.
63. Sedimentation: the process which operates at or near the surface of the ground, or deposits soils, debris and other materials either on other ground surfaces or in the waterbody.
64. Sedimentation Facility: any structure or area which is designed to retain suspended sediments from collected stormwater runoff, to include sediment basins.
65. Site: any tract, lot, or parcel of land or combination of tracts, lots, or parcels of land which are in common ownership, or are contiguous and in diverse ownership where development is to be performed as part of a unit, subdivision, or project.
66. Special flood hazard Area (SFHA): an area having special flood, mudflow, or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map as Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE, or V. For the purpose of determining Community Rating System premium discounts, all AR and A99 zones are treated as non-SFHAs.
67. Stormwater Management System (or Drainage System): the surface and subsurface system for the removal of water from the land, including both the natural elements of streams, marshes, swales, and ponds, whether of an intermittent or continuous nature, and the man-made element which includes culverts, detention/retention facilities and the storm sewer system, further defined as:
 - a. Minor Drainage System: all street drainage, curb and gutters, pipe systems, culverts, ditches and channels which drain less than 40 acres.
 - b. Collector System: all drainage systems draining at least 40 acres but less than 100 acres.
 - c. Major Drainage System: all drainage systems draining at least 100 acres but less than 300 acres.
 - d. Flood Plain System: all natural channels, creeks or rivers draining more than 300 acres.
68. Storm Frequency: rate of likely recurrence of a rainstorm (see Flood definition for further detail). Stormwater Management Plan: a drainage system plan which fully indicates necessary land management and treatment measures, including a timetable

of the schedule for their installation, which will effectively minimize soil erosion and sedimentation and which is approved as provided herein for application to a particular area or parcel of ground. This plan includes the technical report containing all engineering calculations and construction drawings.

- 69. Structures: anything constructed or erected, the use of which requires a location on the ground, or attached to something having a location on the ground, including, but not limited to, tennis courts, swimming pools, fences, and buildings.
- 70. Subdivision: the division of a tract of land or of a parcel of land into two (2) or more lots, building sites, or other divisions, for the purpose, whether immediate or future, of sale, legacy, or building developments which includes any of the following:
 - a. The creation of a new county road or the alteration of an existing road
 - b. The need for drainage, sedimentation or flood control measures,
 - c. The installation of a water delivery system, or
 - d. The installation of a sewerage system.

Subdivisions shall not include the division of a tract of land wherein each lot created is equal to the standards of the Lexington County Health Department regarding the use of individual wells and septic tanks and does not involve any of the activities referenced in items (a) through (d) above. When appropriate to the context, the term subdivision relates to the process of subdividing or to the land area subdivided.

- 71. Substantial damage: damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Such repairs may be undertaken successively and their costs counted cumulatively. Please refer to the definition of "substantial improvement". Vegetation: all plant growth, especially trees, shrubs, mosses, and grasses.
- 72. Substantial improvement: any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This term includes structures that have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:
 - a) any project of improvement to a structure to correct existing violations of State or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions (does not include American with Disabilities Act compliance standards); or,

- b) any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.
- c) Permits shall be cumulative for a period of five years. If the improvement project is conducted in phases, the total of all costs associated with each phase, beginning with the issuance of the first permit, shall be utilized to determine whether "substantial improvement" will occur.

- 73. Variance - is a grant of relief from a term or terms of this manual.
- 74. Violation – the failure to be fully compliant with these regulations.
- 75. Virgin-cut: a cut or excavation into natural ground, which has not been exposed for more than 90 days.
- 76. Watercourse: any natural or man-made conveyance used to transport runoff from one location to the next.
- 77. Wetlands: those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

CHAPTER 2 - LAND DISTURBANCE PERMITTING PROCEDURES

This chapter provides developers, owners, engineers, contractors, and others with information on how to obtain a Land Disturbance Permit (LDP) as required by Public Works Stormwater Division (PW/SWD). This section describes conditions when a LDP is needed, the types of permits that apply to different situations, application package requirements, and when waivers of such requirements are applicable. General information on stormwater planning and its importance is also provided. These requirements must be met prior to any land disturbing activities and before a LDP will be issued. PW/SWD has been granted authority to enforce such requirements, issue permits, and can penalize those that fail to comply. PW/SWD has, at its discretion, the authority to clarify as it sees fit, any situation not adequately covered by these regulations. PW/SWD may impose further restrictions as necessary to ensure the health, safety, and general welfare of the citizens of Lexington County, the economic viability of the community, and the prevention of environmental degradation.

The focus of this application process is for proper development planning, design, and assuring the applicant takes the appropriate steps necessary to control the discharge of stormwater, sediment, and other pollutants during and after land disturbing activities. This process is intended to ensure comprehensive planning, foster communication among the various parties, and comply with environmental regulations pertaining to stormwater management.

Unless otherwise provided within the Stormwater Management Ordinance or this Manual, the surface of land in Lexington County shall not be disturbed or altered for any purpose. No major drainage channel shall be impeded or encroached upon, nor any alteration or encroachment of a flood area, except in accordance with a LDP approved by the PW/SWD. Land disturbance activities cannot commence prior to issuance of a LDP. Waivers may be granted upon determination that the integrity of the Stormwater Management Ordinance and the provisions of this Manual will not be violated by such action. The procedure for waiver submission and approval is covered in Section 2.14.

2.1 Land Disturbance Permits

It shall be the responsibility of the applicant to determine the appropriate permit and process to use; however, PW/SWD has the authority to require a specific permit level as necessary to protect the citizens of Lexington County, surrounding property, the County's existing drainage system, and WoS. The following are two types of LDP issued by Lexington County:

1. Small Commercial Disturbance Permit: for land disturbing activities on commercial properties that disturbs less than one acre. Any commercial re-development projects disturbing less than one acre also fall under this level. The PW/SWD has the right to require a General LDP for these type projects, to be determined on a case by case basis.

2. General Land Disturbance Permit: for activities disturbing greater than or equal to one acre, whether commercial or residential.

The construction of a single-family residential structure that is part of a larger common development will require the building permit applicant to become a permit holder under the General LDP issued to the original applicant. The construction of a single-family residential structure that is not part of a larger common development, but disturbs greater than one acre must receive a General LDP.

The construction of a single-family residential structure not part of a common development disturbing less than one acre shall not require a General LDP. Instead, each building permit applicant shall be required to complete and certify, as part of the building permit application, that erosion control measures will be installed and maintained. The appropriate application shall be part of the building permit application process.

Utility companies are not exempt from NPDES requirements. When applicable, Lexington County must regulate utility projects just as any other type of construction. However, since many utility projects are small, linear, and underground, there is often little or no long-term impact compared with other construction types.

The procedure for applying for a LDP is slightly different depending on the size and scope of the activity. The flow chart shown in Appendix H provides additional guidance on the application process. In general, the procedure for the Small Commercial Permit will require less detail than the General LDP. The different submittal components are detailed in the following sections.

2.2 Pre-Submittal process

2.2.1 Stormwater Concept Plan

The Concept Plan should be submitted to the PW/SWD. For General LDP, a Stormwater Concept Plan should be included as part of the pre-submittal meeting. Small Commercial Applications may skip this step unless requested by the PW/SWD. This Concept Plan gives the design professional the opportunity to propose a site layout and stormwater controls to PW/SWD. The PW/SWD may exempt the requirement for a concept plan for a General LDP application on a case-by-case basis.

The concept plan may be preliminary sketch of the site and shall contain the following items, when applicable:

1. A preliminary sketch of the site showing the layout;
2. Vicinity map;
3. Pre- and post-development runoff patterns and discharge points;
4. Location(s)/distances to WoS and all other existing natural features such as wetlands, ponds, lakes, floodplains, and stream buffers;

5. Location(s) of existing and proposed roads, buildings, utilities, parking areas and other impervious surfaces;
6. Lexington County's GIS topography

Upon submittal and discussion of the Concept Plan and related concerns, the applicant may create and submit a complete LDP application.

2.2.2 Pre-submittal meeting

The pre-submittal meeting should be set up in conjunction with the submission of the Concept Plan. This meeting should take place at the site to be developed. This meeting allows all of the entities involved in the land development process to understand the stormwater management requirements and identify the areas on the site that will require the most attention to meet the requirements of the regulations. This meeting is designed to establish a partnership between all of the entities involved, and provide an understanding of the development requirements for the specific site. PW/SWD reserves the right to request a pre-submittal meeting for Small Commercial Permit applicants.

In addition, the applicant should be prepared to discuss the following items, when applicable:

1. All modeling methodologies to be used;
2. Applicability of any adopted Total Maximum Daily Loads (TMDLs) or other water quality concerns that may impact the allowable pollutant load that can be discharged;
3. Preliminary waiver or variance requests;
4. Others as requested by the PW/SWD.

2.3 Land Disturbance Permit Application Submittal

The original permit application submittal shall be made to the Lexington County Community Development Department. The submittal package is then distributed to other County departments for their review. The Community Development Department should be contacted for a complete list of those department's requirements.

The remainder of this document describes the procedures and submittal requirements of PW/SWD. The PW/SWD will require applicants that need permit coverage from a state or federal agency to have such permits in hand prior to permit issuance (e.g. NPDES permit, 401 certifications, and Navigable Waters permit from the US Army Corps of Engineers, etc.).

2.4 Permit Submittal Requirements

2.4.1 Small Commercial Disturbance Permit

This permit may be issued as defined in Section 2.1. The following items should be submitted for this permit type.

1. **Application Form for Small Commercial Disturbance:**

This application form is listed in Appendix A. All information requested shall be complete. The original application and signature shall be submitted in the permit application package.

2. **Site Narrative:** The narrative should describe the site in general, the purposes of the land disturbance, existing and proposed runoff patterns, outfalls, and upstream runoff, critical downstream areas, potential problems with adjacent properties, and receiving waterbodies. Any access, easement, and/or agreements shall be adequately defined.
3. **Project Sketch:** A sketch to accompany the narrative project area showing:
 - a. Location of all existing and proposed stormwater management control facilities and outfalls (a 1:24,000 scale USGS topographic map is recommended for this portion), 100-year floodplain as presented on FIRM maps, and general topography and WoS in relation to proposed project,
 - b. Necessary measures for energy dissipation, proper design of fill slopes and embankments, and channel stabilization,
 - c. Sediment and erosion control plan showing the location of all erosion and sediment control facilities,
 - d. Construction limits and sequence during and after construction,

2.4.2 General Land Disturbance Permit

This permit may be issued as defined in Section 2.1. The following submittal requirements must be provided to receive this permit.

1. **Application Form for General Land Disturbance Activities:**

This is a dual SCDHEC/Lexington County application as shown in Appendix A that serves as the NOI to SCDHEC and Lexington County. All information requested shall be complete. The original application with signatures shall be submitted in the permit application package.

2. **Site Narrative:**

A narrative should be submitted with the permit application describing the site in general, purposes of the land disturbance, topographic and soil information, adjacent properties and owners, waterbodies receiving stormwater runoff (existing and proposed), existing water quality and flooding issues, and anticipated impacts and benefits. If applicable, the narrative should also contain justification for variances, waivers, or other special conditions of the site. Wetland and/or WoS disturbance issues should be discussed along with detail on the status of necessary permit application to the USACE and/or SCDHEC.

3. Technical Report:

The technical report should be prepared upon receiving acceptance of the stormwater concept plan and as part of the application package. This shall consist of maps, narratives, supporting design calculations for the proposed stormwater system and sediment and erosion control measures used during construction. The technical report includes, but is not limited to, the following sections, when applicable:

- a. Pre and Post development hydrologic analysis and calculations that determine the existing stormwater runoff volumes, peak flow rates, flow velocities, and pollutant loads. Such information shall be provided for all delineated sub basins/discharge points;
- b. The project shall control stormwater quantity and quality as defined in Chapter 3;
- c. Stormwater management system design to include:
 - i. Narrative describing the stormwater management system, methodologies to be used in their design, existing and proposed runoff patterns, outfalls, upstream runoff, and critical downstream areas,
 - ii. Location of all existing and proposed stormwater management control facilities and outfalls (a 1:24,000 scale USGS topographic map is recommended for this portion),
 - iii. Supporting calculations that justify that the system meets Lexington County and NPDES General Permit requirements, including but not limited to: hydrographs, stage-storage volumes, routing of hydrographs, stage-discharge values for water quantity and water quality control facilities, design calculations and elevations for all stormwater conveyance systems, strategy for controlling runoff pollutants, pollutant loads in compliance with any TMDLs, estimates of trapping efficiencies of each BMP used and long term maintenance requirements of each, design details and specifications,

- pipe capacity and velocity calculations, open channel capacity and velocity calculations, and water surface elevations,
- iv. Design should also contain measures for energy dissipation, proper design of fill slopes, embankments, and channel stabilization,
 - v. Maintenance schedules and details for each permanent stormwater management facility, if applicable.
- d. Special Protection Areas: narrative should include description of how the project will comply with the applicable criteria for these areas;
 - e. Sediment and erosion control plan: narrative should include description of the erosion and sediment control facilities selected:
 - i. Location of all erosion and sediment control facilities and BMPs,
 - ii. Resulting design calculations, trapping efficiencies, maintenance schedules, and details for all sediment control facilities,
 - iii. Explanation/discussion of models used in the design,
 - f. Downstream analysis calculations showing the effect of post-development design flows on downstream stormwater conveyance systems and channels;
 - g. Where any watercourse that lies within a special flood hazard area will be altered or relocated as a result of proposed development, the application for a LDP shall include a detailed flood study. A detailed study is also required if development is to occur in an approximate A zone of the regulated floodplain covering 5 lots or 50 acres, whichever is less, or if development is to occur in the floodway;
 - h. If constructing a medium or high hazard dam, as defined in the state's Dam Safety Act, then a dam breach analysis shall be submitted as defined in Chapter 3;
 - i. Location of identified 100-year floodplain as presented on FIRM maps;
 - j. Location map showing topography and WoS in relation to proposed project;
 - k. Delineation of any wetlands/WoS (approval by USACE and or SCDHEC should have been achieved or applied for);
 - l. Identification and classification of all soil types expected to be encountered or used at the development site;
 - m. Presentation of existing and proposed contours at the development site;

- n. General description of the adjacent property and description of existing structures, buildings, and other fixed improvements located on surrounding properties;
- o. Construction limits and sequence during and after construction;
- p. Site access (easements);
- q. A USGS map with the site outlined and the direction of flow to the nearest waterbody

4. Construction Plans

One (1) complete set of certified and signed construction plans and specifications are to be turned in at the LDP application submittal.

Additional sets of certified and signed construction plans and specifications will be requested by the PW/SWD when the review is complete.

The information required on the construction plans shall include, but are not limited to the following list. Some items may be included in other components of the permit application package, but should be adequately noted.

- a. Plan sheets/drawings shall be a standard size of 24" X 36";
- b. The following lists the required items that shall be disclosed within the set of plans. Other items may be requested by PW/SWD on a case-by-case basis:
 - i. North arrow and correct scale,
 - ii. Property lines, tax map numbers, adjacent landowners' names, and land use conditions,
 - iii. Legend,
 - iv. Registered Professional Engineer's seal,
 - v. Certificate of Authorization seal, as appropriate,
 - vi. Existing and proposed contours and land uses no larger than 2 foot intervals extending 100 feet outside the boundary lines. Contours are to be tied to a known datum no assumed elevations are allowed,
 - vii. 100-yr floodplain contour line and associated floodway (FEMA and County),
 - viii. Limits of disturbed area,

- ix. Delineation of wetlands and/or WoS,
- x. Easements,
- xi. Road and stormwater system profiles with existing and proposed ground elevations,
- xii. Construction sequence (include implementation of all stormwater and sediment and erosion controls in the first phase of construction),
- xiii. Locations and details of all temporary and permanent control measures,
- xiv. Locations and details of all sediment and erosion control measures,
- xv. Grassing and stabilization specifications and schedule,
- xvi. Maintenance requirements (for temporary and permanent controls, grassing, etc.),
- xvii. Construction entrance/exit with detail,
- xviii. Tree protection, preservation, overall landscaping plan with appropriate species selection and screening for ponds, and other components as required by the Landscaping Ordinance,
- xix. Details and specifications of all necessary construction components,
- xx. Standard notes,
 - (1) If necessary, slopes which exceed eight (8) vertical feet should be stabilized with synthetic or vegetative mats, in addition to hydroseeding. It may be necessary to install temporary slope drains during construction. Temporary berms may be needed until the slope is brought to grade.
 - (2) Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen (14) days after work has ceased, except as stated below.
 - (3) Where stabilization by the 14th day is precluded by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth-disturbing activities will be resumed within 14 days,

temporary stabilization measures do not have to be initiated on that portion of the site.

- (4) All sediment and erosion control devices shall be inspected every seven (7) days. Damaged or ineffective devices shall be repaired or replaced, as necessary.

OR

All sediment and erosion control devices shall be inspected at least once every fourteen (14) calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater. Damaged or ineffective devices shall be repaired or replaced, as necessary.

- (5) Provide silt fence and/or other control devices, as may be required, to control erosion during utility construction. All disturbed areas shall be cleaned, graded, and stabilized with grassing immediately after the utility installation.
- (6) All erosion control devices shall be properly maintained during all phases of construction until the completion of all construction activities and all disturbed areas have been stabilized. Additional control devices may be required during construction in order to control erosion and/or offsite sedimentation. All temporary control devices shall be removed once construction is complete and the site is stabilized.
- (7) The contractor must take necessary action to minimize the tracking of mud onto the paved roadway construction areas. The contractor shall daily remove mud/soil from pavement, as may be required.
- (8) Residential subdivisions require erosion control features for infrastructure as well as for individual lot construction. Individual property owners shall follow these plans during construction or provide an individual plan meeting section R.72-307 of the Stormwater Management and Sediment Reduction Act.
- (9) Temporary diversion berms and/or ditches will be provided as needed during construction to protect work areas from upslope runoff and/or to divert sediment laden water to appropriate traps or stable outlets.

- (10) All waters of the State (WoS), including wetlands, are to be flagged or otherwise clearly marked in the field. A double row of silt fence is to be installed in all areas where a 50-foot buffer can't be maintained between the disturbed area and all WoS. A 10-foot buffer should be maintained between the last row of silt fence and all WoS.
 - (11) Litter, construction debris, oils, fuels, and building products with significant potential for impact (such as stockpiles of freshly treated lumber) and construction chemicals that could be exposed to storm water must be prevented from becoming a pollutant source in stormwater discharges.
- xxi. The cover sheet shall contain, at the minimum, the following items:
 - (1) Project Name,
 - (2) Engineers Contact Information (name, mailing address, telephone, fax),
 - (3) Developers Contact Information (name, mailing, address, telephone, fax),
 - (4) Location Map (North arrow, project outline and labeled names of roads, tax map number), and
 - (5) Table of Contents,
 - (6) Room in lower right corner for approval stamp
- xxii. Sight distances,
- xxiii. Location of existing roads and/or commercial drives across from the proposed access entrance(s),
- xxiv. Show that all fill slopes are stabilized,
- xxv. Drainage areas (both on and off-site) with characteristics
- c. In addition subdivisions projects should include:
 - i. lot layout/site plan and staking,
 - ii. acreage, utilities (water and sanitary sewer),
 - iii. traffic patterns with temporary (construction) and permanent traffic signage.

While some of these items lend themselves to combining on a single sheet/drawing, care should be taken to ensure that plans are not overcrowded/cluttered;

- d. Roadways shall be shown on plan/profile sheets. These sheets shall contain curve radii, grades, crossline pipes, catch basins, utility crossings, and other data associated with the roadway. The top half of the plan/profile sheet should contain the plan view and the bottom half should contain the profile. The preferred scale is either one (1) inch equals 50 feet horizontally with a corresponding vertical scale of one (1) inch equals five (5) feet or one (1) inch equals 100 feet horizontally with a corresponding vertical scale of one (1) inch equals ten (10) feet;
- e. All available or used benchmarks shall be shown on this or other applicable sheet. At least one (1) benchmark shall be available or established on/near (within survey instrument sight distance) the site. The benchmark shall be referenced to mean sea level (M.S.L.). If necessary, PW/SWD will assist in locating the nearest established Benchmark;
- f. Specifications for all components of the construction activities related to grading, utilities, sediment and erosion control, temporary and permanent vegetation, water quality BMPs, etc.;

5. Stormwater Pollution Prevention Plan (SWPPP):

A SWPPP is a site specific document that identifies sources of stormwater pollution on a construction site, describes practices that will be used to reduce pollutants in stormwater discharges and identifies procedures the applicant will implement in order to comply the conditions of the LDP. The SWPPP shall also include descriptions of the site and of each major phase of planned activity, the roles and responsibilities of contractors and subcontractors, and the inspection schedule and logs. Modifications to the construction plans and associated stormwater prevention activities should also be documented in the SWPPP. An effective SWPPP should contain the following items:

- a. Cover/Title Page
- b. Project and SWPPP contact information
- c. Site and activity description including site map
- d. Identification of potential pollutant sources
- e. Description of controls to reduce pollutants
- f. Maintenance/inspection procedures
- g. Records of inspections and follow-up maintenance of BMPs

- h. SWPPP amendments
- i. SWPPP certifications
- j. Copy of the SCDHEC Construction General Permit

A SWPPP is required for projects that disturb greater than or equal to one acre. The SWPPP needs to be submitted as part of the permit application package for PW/SWD. Further guidance can be found in the United States Environmental Protection Agency's (EPA) document entitled, "Developing your Stormwater Pollution Prevention Plan: A Guide for Construction Sites" (2007). The SWPPP requirement applies to both development and re-development sites. The SWPPP must be kept on the construction site during all phases of construction. A checklist for SWPPP components is provided in Appendix G, as is a template for an applicant's use.

6. Fees:

All required fees (except the NPDES fee) should be submitted with the permit application package. Contact the PW/SWD for further guidance on fee schedule. The details of the fees are listed below:

- a. For all land disturbing activities, the following fees apply:

Residential Subdivision Construction

Plan Review	\$575 and \$12 per additional lot
Additional Plan Revisions (after 1 st)	\$575
Construction Inspections	\$1150 and \$12 per additional lot
Re-inspections (all, after 2 nd inspection)	\$230

Commercial Construction

Project Review	\$575 and \$115 per disturbed acre or portion thereof
Additional Plan Revisions	\$288
Small Commercial Permits only	\$288
Commercial Project Inspections	\$1150 and \$115 per disturbed acre or portion thereof
Re-inspections (all after 2 nd inspection)	\$230

Fees are subject to change per approval from the Lexington County Council.

- b. NPDES: For all land disturbing activities involving one (1) or more, an NPDES General Permit coverage fee of \$125.00 applies in addition to the Lexington County review/inspection fees listed below. This fee will be forwarded on to SCHDEC by Lexington County after the plan review has been approved.

7. Maintenance Schedules and Agreements:

When stormwater management facilities and system components are to be maintained by an owner, lessee, or other designated party, Lexington County must be given assurance that such activities will be conducted. This is to be established using legally binding agreements that require maintenance during and after construction, creation of maintenance schedules for all stormwater system components, and designation of the responsible parties in perpetuity. A copy of all maintenance agreements are listed in the Appendix E.

2.5 Plan Review Process

Once the package is received by the PW/SWD, the Division shall have twenty (20) working days to approve, deny or issue comments to the applicant. If notice is not given to the applicant or if action is not taken by the end of the 20th working day period, the application package will be considered approved by Lexington County without review. If a project is considered approved without review the roads and storm drainage system shall not be taken into the Lexington County maintenance system and will be considered privately maintained. Lexington County reserves the right to correspond with the applicant on separate portions of application package (i.e. first comments/request for information may only address erosion control measures). This will most likely occur due to internal time and labor constraints. The review checklists used by the PW/SWD are provided in Appendix K.

If review comments or a request for further information is required or a denial is issued, a letter detailing these issues will be mailed to the applicant. Prior to replying to this letter, a meeting between the PW/SWD, engineer and developer is required. This meeting is to address the issues listed in the letter mailed to the applicant. This meeting is not to serve as a re-submittal review. The applicant cannot resubmit plans until after this meeting has taken place. No new fees are needed.

Revisions are submitted directly to the PW/SWD. Once received the Division has 20 working days to review, approve or deny. If notice is not given to the applicant or if action is not taken by the end of the respective time period, the application package will be considered approved without review.

If the revisions did not contain all necessary information, correspondence will be made by the PW/SWD to the applicant/engineer. The applicant must then reply with the requested information. This constitutes a second revision and requires an additional review fee. This process will continue until all information needed by the PW/SWD has been received, with each request constituting another review that requires an additional review fee.

Once the review is complete, the PW/SWD will begin the process of permit approval and issuance. For Small Commercial Disturbance Permit applications and General LDP applications disturbing less than one acre, Lexington County will issue a permit and approval letter to the applicant. If the project is located within a municipality, the permit will be forwarded directly to the municipality, and they will distributed the permit to the applicant.

For General LDP applications disturbing one or more acres, the PW/SWD will request by phone or in writing for the applicant/engineer to submit the additional full sets of construction drawings and the NPDES permit coverage fee. The County's approval letter, the application for the General permit and the permit coverage fee will then be forwarded to SCDHEC for coverage under the NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities. SCDHEC may request additional information from the applicant. Any such requests will be submitted directly from SCHDEC. The applicant shall copy Lexington County on any such submittals. Review time is dictated by SCHDEC. Once all information requested by SCDHEC has been satisfied, a letter will be mailed to the applicant granting coverage under the NPDES Construction General Permit. The applicant must then notify the PW/SWD that NPDES permit coverage has been granted by DHEC. Once the PW/SWD is notified the General LDP can be issued by the PW/SWD. If the project is located in a municipality, that has adopted the Lexington County Stormwater Ordinance, the General LDP will be forwarded to the municipality to distribute the permit to the applicant. The applicant is responsible for obtaining approval from other County Departments (Zoning, Landscaping, etc.). Approval for these components is beyond the responsibility of the PW/SWD. At the end of this process, the owner will have two permits, one from SCDHEC (NPDES), and one from Lexington County.

The PW/SWD reserves the right to deny coverage if an application fails to conform with the provisions of the Stormwater Management Ordinance and/or this Manual.

2.6 Project Construction

The applicant shall notify the PW/SWD 48 hours before construction begins. A pre-construction conference shall be required for all sites obtaining a General LDP. Construction activities must adhere to the provisions agreed to in the approved LDP. Any substantial revisions to the approved General LDP shall be submitted in writing to PW/SWD along with any subsequent fees. Such changes shall not be implemented until approval is given. Revisions may not be made for Small Commercial LDP without prior approval from the PW/SWD.

The owner is required to maintain at least one copy of all approved permits, technical reports, construction documents and SWPPP onsite at all times during construction. The LDP shall be posted in a visible location on the site. PW/SWD will conduct inspections during the construction phase. Frequency and specific times and dates of these inspections will be done at the discretion of PW/SWD. More information on inspections is given in Chapter 5. During construction, the owner or designated representative (contractor) will conduct inspections of all temporary sediment and erosion controls on the site in accordance with the submitted and approved maintenance schedule.

2.6.1 Transfer of Land Disturbance and/or NPDES Permit Coverage

1. If the permit holder wishes to transfer the permit coverage to a new entity, written documentation from the engineer of record and the permit holder must be submitted to the

PW/SWD. The engineer of record must submit new plans with certifications signed by the new permit holder. If a performance bond has been executed for the project, a new bond and supplemental surety from the new permit holder must be received and approved by the Community Development Department before the permit can be transferred. The transfer of ownership form can be found in Appendix E.

2. When a developer readies a piece of property for a new subdivision by performing grading activities, utility installation, building of roads, then sells a lot or group of lots over to a homebuilder(s), then the homebuilder must sign a certification stating that they accept responsibility under the original General LDP. A copy of this certification can be found in Appendix E and is also provided by the Community Development Department Building Division when a building permit is applied for.
3. The process of transferring NPDES Permit coverage is determined by SCDHEC.

2.6.2 Inspections and Maintenance

Inspections shall be performed as listed in the approved SWPPP document. Maintenance shall be performed as listed in the approved SWPPP document. Records of inspections and maintenance actions will be made in accordance with this permit and be available at all times during construction.

2.7 As-Built

1. **Residential:** It is recommended that as-built drawings be submitted and approved before the submittal of a final plat. The owner shall submit as-built drawings showing the final location of all utilities, location of buildings if applicable, roads, profiles and calculations, etc. as found in the as-built checklist listed in Appendix M. As-built drawings should also delineate any buried material. The as-built drawings shall contain the Lexington County As-Built Certification. If the project is located in a municipality, then two complete sets must be submitted. Once as-builts have been approved, the PW/SWD will conduct a final inspection.
2. **Commercial:** Once the stormwater management facility(s) have been installed an as-built survey must be submitted for each facility on the site. Routing calculations, which include pond volume, outlet detail design, stage storage discharge, cross section of emergency spillway, the 2 through 25 and 100-year storm events calculations, etc. shall also be provided with the survey. This shall be submitted before a final inspection can occur.

2.8 Final Inspections

A final inspection may be requested after the as-built surveys have been approved. The owner shall correct any problems found during the final inspection. Corrections made after the final

inspection that differ from the approved as-built drawings shall result in a revision of the as-built drawings. Upon confirming any such corrections are completed, all disturbed areas, including stormwater management facilities shall be permanently stabilized before the site is considered ready for occupancy. The Community Development Department may release all remaining bonds. This terminates the applicant's responsibilities under the LDP. PW/SWD shall receive and approve as-builts prior to:

1. Use or occupancy of any site,
2. Acceptance of any road into the County inventory,
3. Release of any bond held by the County, and 'Release to Community Development for Final Plat approval and release of performance bond'.
4. Further land subdivision of parcels within the project areas.

For homebuilders who became a General LDP holder or who received an individual LDP, the certificate of occupancy for the home will not be released until the site has reached final stabilization and all temporary sediment and erosion control structures have been removed.

2.9 Exemptions

1. The provisions of this section shall not apply to those items that are exempt in SC Reg. 72-302a.
2. Construction activities of the S. C. Department of Transportation (SCDOT) conforming to the requirements of 1976 SC Code of Laws Section 48-18-70 and corresponding Regulation 72-400. SCDOT is responsible for obtaining approval from SCDHEC.

2.10 Other Authorization or Requirements

Where any authorization, bonds, special requirements, or other securities are required by applicable laws, regulations or ordinances for any part of the proposed work to be done under the permit, the applicant shall, upon request, furnish PW/SWD with satisfactory evidence that such requirements have been met before approving a LDP application. The list below contains some of the potential examples of additional authorizations or requirements when proposed to disturb land within Lexington County. Others may be applicable. It shall be the responsibility of the applicant to determine if other authorizations or requirements are applicable, however the pre-submittal meeting will be helpful in establishing such additional necessities exist.

1. Planning Commission approval (see Section 2.13);
2. Special Protection Areas Regulations (these are typically for areas with known flooding or water quality problems). More information is provided in Chapter 3;

3. USACE/SCDHEC permits for disturbance of all wetlands/WoS,. Wetland delineation documentation must be provided by USACE;
4. Documentation for exemptions to the requirements in the Stormwater Management Ordinance or this Manual should be clear and justified;
5. Applicants shall have obtained all necessary offsite easements needed for roads, utilities, etc.
6. All encroachment permits shall be authorized;
7. Any necessary stormwater discharge agreements shall be recorded;
8. Stormwater management facility maintenance agreement;

2.11 Expiration of Permit

A LDP will remain valid for up to five (5) years from the date of approval. A project will be considered expired after five (5) years has elapsed from the approval date. The project will also be expired if a project is inactive for a period of twelve (12) consecutive months. Requests for an extension of the permit must be submitted to the PW/SWD. Extensions will be reviewed on a case-by-case basis.

2.12 Responsibility of Permit Holder

During any land disturbance operation, the permit holder shall be responsible for carrying out the proposed work in accordance with the permit, approved plans, specifications, time schedules, and in compliance with all requirements of the Stormwater Management Ordinance and this Manual.

2.13 Cases Requiring Planning Commission Approval

Certain subdivisions of land must be reviewed and approved by the Lexington County Planning Commission before a LDP or waiver can be issued. Such projects include Private Road Subdivisions, Innovative Developments, and those subdivisions requiring a variance under the Subdivision Regulations and/or County Ordinances. The specifics of the regulations and the process for land subdivision is given in the separate legal document titled “Subdivision Regulations”.

2.14 Waivers

PW/SWD may grant waivers from the requirements of the Stormwater Management Ordinance and this Manual for individual land disturbances. Waivers for stormwater management are listed in SC Reg. 72-302b.

2.15 Non-floodplain Variances

The Planning Commission may, upon request, grant variances or exceptions to any of the provisions of this Manual, provided such variance or exception is in harmony with the general purpose and intent of the Stormwater Management Ordinance and this Manual. A written request for a variance shall be provided to the Planning Commission and shall state the specific variance(s) sought and the reason(s) with supporting data for their request. The Planning Commission may request and consider the opinion of PW/SWD before deciding upon any variance. Any request for variance shall be clearly stated in the LDP application. Procedures for variances related to floodplain management issues are covered Chapter 3.

2.16 Encroachment Permits

An Encroachment Permit, which controls the impacts of traffic, storm drainage, and sediment entering a public road right-of-way, must be obtained from the SCDOT and/or the Lexington County PW/SWD before construction begins. Applicants should be aware of Lexington County zoning requirements, which may differ from SCDOT's.

A copy of an Encroachment Permit application(s) to SCDOT must be included in the LDP application package. This is allowed because SCDOT will not approve an encroachment unless the LDP has been approved. It is the applicant's responsibility to comply with all SCDOT Encroachment Permit application requirements.

2.17 Easements

The following section provides the required easement widths for various components of the stormwater system. In all cases, there will be an allowance for offset easements, in which the pipe, channel, or other stormwater system component does not necessarily have to be in the middle of the easement width, but may be offset to allow for certain construction needs.

2.17.1 Storm drain pipe Easements

Drainage easements shall provide adequate room for maintenance equipment to operate. Table 2.1 provides required minimum drainage easement widths for some of the more typical situations:

Table 2.1-Storm drain pipe easements

Pipe size (in)	Maximum depth to invert (ft)	Width of drainage easement (ft)
18	3.5	15
24	5.0	20
36	6.0	24
54	7.0	30
72	9.0	36

[Notes: (1) For depths greater than shown, add two (2) feet for each additional foot to the invert.

(2) For larger pipe sizes and/or multiple lines of pipe easement width shall be as determined by the PW/SWD.]

2.17.2 Open channel Easements

A minimum easement width for an open channel/ditch is 24 feet. For channels greater than 4 feet wide and/or 4 feet deeps, the drainage easement width shall be increased by two (2) feet for each additional foot of width and/or depth.

2.17.3 Pond Easements

For all ponds dedicated to Lexington County, a minimum access easement of 20 feet shall be provided to the pond (toe of outside slope) from a public facility (road, parcel, etc.) or some other access acceptable to the PW/SWD. The pond easement shall also include a minimum 10 foot wide strip around the perimeter of all detention and retention facilities extending from the outside toe of the pond berm, as well as a 10 foot all-weather riding surface on the top of the pond berm. The review by the PW/SWD will include check to make sure this access for basin maintenance is sufficient for the pond and surrounding area (e.g. slopes not too steep).

2.17.4 Natural waterbody Easements

The PW/SWD requires that an easement be established for all drainage ways, streams, channels, or other waterbodies. The width of the easement will be determined after depending on site inspection.

2.17.5 Other Stormwater Facilities & BMP Easements

All other structures used for the control of stormwater runoff (quantity or quality) not otherwise covered above, shall have an easement for access and maintenance that is a minimum of 20 feet beyond the boundary of any such structure on all sides. PW/SWD may request or allow other easements widths on a case-by-case basis given site constraints or special conditions.

2.17.6 Offsite Easements

Any required off-site easements shall be obtained prior to LDP approval. Any work done without a proper and adequate easement(s) shall be at the Developer's own risk; no Bonded Plat or Final

Plat approval can be granted for subdivisions until adequate written documentation is provided which verifies the validity of the easement(s). Non-subdivision projects shall provide validation of necessary easements before a LDP will be issued.

2.18 Stormwater Facility Maintenance

2.18.1 Maintenance Responsibility

Residential: Maintenance of stormwater management facilities in new and re-development projects including all pipes, inlets, and other components of the stormwater system shall, in most cases, be the responsibility of the PW/SWD.

If it is not the intent of Lexington County to take over maintenance then this responsibility remains with the developer, Home Owners Association (HOA) or other entity.

For any project, the owner of a portion or the entire stormwater system shall be clearly designated before a LDP will be issued. Maintenance responsibilities shall also be recorded on the final plat. Ownership shall imply responsibility for maintaining the stormwater system, including all ponds and other BMPs used for controlling runoff quantity and quality. Ownership does not imply that the owner(s) may in any way alter the size, or function of any component of the stormwater system without consent from PW/SWD. Owners found altering such components will be required to remove any alterations or pay for expenses incurred by PW/SWD to do the same.

In the event that property is abandoned, PW/SWD will assume responsibility for maintenance of the stormwater system until such time the property is purchased by another entity.

To deal with the possibility of an HOA dissolving in the future, PW/SWD requires as part of the LDP application, certain bylaws of the HOA. These include: require the HOA to include provisions in their recorded declaration to ensure membership is mandatory, ensure the HOA has lien authority and maintains adequate funding at all times, and that it cannot dissolve without another entity accepting maintenance responsibility for the stormwater system. A General LDP will not be issued until PW/SWD has received the stormwater management facility maintenance agreement.

Commercial: In new and re-development projects, ownership of the entire stormwater system (conveyances, as well as all BMPs, ponds, etc.) shall belong to the owner, or a lessee(s).

2.18.2 Maintenance

Each component of the stormwater management system (pipes, inlets, BMPs) shall have a maintenance plan (activities and associated schedule) as part of the application package for a LDP. The plan shall also cover temporary measures used during construction in addition to the long term maintenance of the system. These details may be covered in the Stormwater Pollution Prevention Plans, or SWPPP, if required, but must be included somewhere in the permit application. Suggested maintenance activities and recurrence intervals for water quality BMPs are discussed and referenced in Chapter 3.

In addition, the owner, and lessee if applicable, will enter into a permanent maintenance agreement with Lexington County. This legal document, called *A Covenant for Permanent Maintenance of Stormwater Facilities* (CPMSF), is recorded in the permanent land records with the Lexington County Register of Deeds, in addition to being fully described on the final plat. The CPMSF document is prepared by the Stormwater Division using information supplied by the property owner, and must be signed and executed prior to the issuance of a LDP.

The Covenant allows for maintenance responsibility to be performed by a lessee or other temporary partner. However, the owner must also be listed. Ownership by an HOA is also covered.

PW/SWD will inspect a system as it deems necessary to ensure maintenance is being performed both during construction and after.

More detail is provided in Chapter 5 on maintenance procedures and requirements.

CHAPTER 3 - DESIGN REQUIREMENTS

This chapter provides engineers, designers, developers, and others with the necessary information to assist with the development of systems that will control the rate, volume, and pollutants released from a new or re-development projects. The Public Works Stormwater Division (PW/SWD) has been authorized by law or agreement to enforce this design requirement. These design requirements have been developed based on common Best Management Practice and reference State and Federal regulations, engineering publications, and other municipal and academic guidance.

It is an overall goal of this Chapter to provide a set of design standards that will result in effective stormwater management. The purpose of the goal is to mitigate the impact of land development on existing/natural hydrologic and hydraulic processes, as well as attempt to prevent further degradation of the water resources in Lexington County through proper planning and design. The design professional is encouraged to use all means necessary to develop land in a manner consistent with County Ordinances and this Manual. Specific methods and applications not covered in this section should be discussed with the PW/SWD for applicability.

3.1 General Requirements

General requirements for all stormwater systems will include, but not limited to the following:

1. Site designs shall minimize the generation of stormwater and maximize pervious areas for stormwater treatment. Designs shall also include:
 - a. Knowing the major characteristics of the land area and kinds of soil helps in identifying and evaluating potential drainage problems. Select portions of the site where the drainage pattern, topography, and soils are favorable for the intended use.
 - b. Exposing the smallest practical area of land for the least possible time during development. This includes preserving natural buffers and phasing of disturbed areas.
 - c. Limiting the drainage area to all BMPs. Specific maximum contributing areas to BMPs are provided later in this chapter.
 - d. Retaining and protecting natural vegetation. Topsoil should be saved and used in the stabilization process. Permanent vegetative cover shall be established as soon as practicable during the development process.
 - e. Using plant cover, mulching, hydroseeding and BMPs for sediment and erosion control during and after construction.

2. Annual groundwater recharge rates should be maintained to the maximum extent practical by promoting infiltration through the use of structural and non-structural methods.
3. Stormwater runoff generated from development shall be controlled to pre-developed conditions. These conditions include rates, volume, and quality.
4. Stormwater runoff generated from development shall be treated through the use of structural and/or non-structural practices.
5. Stormwater discharges to special protection areas with sensitive resources are subject to additional performance criteria (See Section 3.9).
6. All privately owned stormwater facilities shall have a maintenance covenant. This covenant is to be recorded with the Register of Deeds in Lexington County (See Chapter 5)
7. Re-development is governed by the same design criteria as new developments.
8. Sediment basins and other BMPs shall be used during construction to remove heavy sediment loads from stormwater runoff leaving the disturbed area. The use of matting suspended on steel posts to form baffles is highly recommended to aid with trapping suspended sediments in these basins.
9. Erosion protection and sediment control shall be installed on the perimeter of the site, along all waterbodies, and other steep or susceptible areas before clearing begins. Erosion protection and sediment control measures shall be maintained throughout construction process.
10. Sediment shall be kept out of closed systems to the maximum extent practicable. Closed systems shall be clear of all sediment prior to the final inspection by Lexington County.
11. As practicable, discolored water should be treated before release from a detention pond as recommended by the Lexington County Soil and Water Conservation District.
12. If wetlands/Waters of the State are suspected to exist on a property, they should be investigated and delineated by a qualified consultant. If wetlands are present, Lexington County will not issue a Land Disturbance Permit without a confirmation or denial letter from the US Army Corps of Engineers (USACE).
13. All stormwater management and sediment control practices shall be designed, constructed, and maintained with consideration for the proper control of mosquitoes and other vectors.
14. The entire watershed that drains to a particular design point shall be included in determining the appropriate design storm. All drainage systems regardless of size

or classification shall be analyzed and revised as necessary to ensure that overflow of the system due the 100-year storm event would not result in a likelihood of dwelling flooding, property damage or public access and/or utility interruption. All computations shall be based on the contributing watershed, not just the project area or disturbed area. Classification of stormwater systems are as follows:

a. Minor Drainage Systems: 0 - <40 Acres

All drainage systems, excluding ponds that carry less than 40 acres of stormwater runoff shall be designed to carry flows resulting from a ten (10) - year storm event. Ditches and channels must be designed for the twenty-five (25) - year storm event.

b. Collector Systems: 40 - <100 Acres

All drainage systems, excluding ponds, that carry at least 40 acres but less than 100 acres shall be designed to carry flows resulting from a twenty-five (25) - year storm event.

c. Major Drainage Systems: 100 - <300 Acres

All drainage systems, excluding ponds, that carry at least 100 acres but less than 300 acres, shall be designed to carry a flow resulting from a fifty (50)-year storm event. Encroachment upon Major Drainage Channels and the adjacent overflow land shall be avoided to the extent possible.

d. County or FEMA Floodplains: 300 and more Acres

Bridges and culverts being constructed in natural channels, creeks, or rivers draining more than 300 acres, shall be designed to carry a flow resulting from a one-hundred (100)-year storm event. Encroachment upon these channels shall be avoided to the maximum extent practicable.

The Floodplain provisions in Chapter 6 shall apply, where applicable, to drainage systems which drain 300 or more acres.

3.2 Hydrologic Computation Requirements

All hydrologic computations shall be completed using volume-based hydrograph methods acceptable to the PW/SWD. The design storm duration for these computations shall be the 24-hour storm event and a SCS Type II distribution with a 0.1-hour duration time increment. Typical hydrologic inputs include, but are not limited to the following:

1. Precipitation depth or intensity,

2. NRCS soil classification and hydrologic soil group (Lexington County soils information can be found at www.lex-co.com),
3. Land use and appropriate Curve Numbers,
4. Time of concentration, and
5. Hydrographs.

All hydrologic computations shall be presented in an easily reviewable format. This format shall include pre- and post-development runoff rates and volumes.

The remainder of this section will provide basic information for the hydrologic calculations. As discussed, the intent of the Manual is not to provide detail on every aspect of hydrologic computations, their limitations, assumptions, appropriateness of use, but rather general guidance on generally accepted standards. This Manual does, however, reference suggested materials as necessary for detailed discussion of related topics.

3.2.1 Precipitation Depths/Intensities

The precipitation depths/intensities corresponding to various return periods to be used for projects in Lexington County are shown in Table 3.1.

Table 3.1: Design storm precipitation data for Lexington County, South Carolina

Design Storm Event	First-Flush	1-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Intensity (inches/24 hours)	1 st ½" or 1" of runoff	3.1	3.6	4.5	5.3	6.4	7.3	8.3

3.2.2 Recommended Methodologies

The PW/SWD recommended methods and corresponding design circumstances are listed in Table 3.2 and 3.3 below. If other methods are used, approval must first be given by PW/SWD. Complete source documentation must be submitted for approval.

Table 3.2: Recommended methodologies based on land disturbance area

Method	Size Limitations*	Comments
(Modified) Rational Method	0 – 2 Acres	Acceptable for sizing individual culverts or storm drains that are not part of a pipe network or system. <u>Not to be used for storage design.</u>
“SCS Method” (TR-55)	0 – 2000 Acres	Used for estimating peak flows from urban areas.

USGS Regression Equation	> 2000 Acres	Used for estimating peak flows for all design applications for areas between 2,000 and 16,000 acres and estimating hydrographs for all design applications for areas between 128 and 16,000 acres.
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*Size limitations refer to the subwatershed size to the point where a stormwater system component (i.e., culvert, inlet, BMP) is located.

Details of Rational Method and Modified Rational Method can be found in Chow (1988), ASCE (1996), USDA (1996), and Mays (2001). Documentation on the commonly used SCS (or NRCS) Method can be found on the US Department of Agriculture website (<http://www.wcc.nrcs.usda.gov/hydro/hydro-tools-models-tr55.html>). The USGS regression equations for South Carolina can be obtained from the US Geological Survey website (<http://water.usgs.gov/osw/programs/nffpubs.html>). Haan, C. T., Barfield, B. J., and Hayes, J. C. (1995) and USDT (1996, 2001) can also be referenced for greater detail on hydrology calculations and assumptions.

Table 3.3: Recommended hydrologic methods for designing various stormwater management systems and controls

Method	Rational Method	SCS Method	USGS Equations
Extreme Flood Protection		+	+
Storage/Sedimentation Facilities		+	+
Outlet Structures		+	+
Gutter Flow and Inlets	+	+	
Storm Drain Pipes	+	+	+
Culverts	+	+	+
Small Ditches	+	+	+
Open Channels		+	+
Energy Dissipation		+	+

Soil types in Lexington County range from sands and sandy clays to clays. Appendix D contains a soil map of Lexington County. Existing land use and corresponding runoff potential factors should be obtained from the site visit and other appropriate sources. Appropriate runoff potential factors can be found in several of the references listed in the Chapter 6.

Methods for calculating the time of concentration and abstraction are numerous. However, a minimum time of concentration of six (6) minutes shall be used for all hydrologic calculations. See references given above for the suggested methodologies for information on these calculations.

Hydrographs should be used to evaluate entire systems by routing storm events through pipe or storage systems. The use of a hydrograph will provide better insight into system performance than

simply using the peak discharge. Lexington County will accept commonly used computer models. New models may be accepted with appropriate documentation.

3.3 Water Quantity Control Requirements

Water quantity control is an integral component of overall stormwater management. Its purpose is to negate the effects of stormwater runoff associated with land use changes due to development during storm events. The following design criteria are established for water quantity control.

1. All permanent stormwater management facilities associated with new and redevelopments shall be designed and constructed to detain the pre-developed runoff volume for the 2 and 10-year 24-hour storm events for a period of 24-hours. To assist with design constraints, a tolerance may be given for peak flow rate matching for all storm events. A discussion on design procedures are presented in Section 3.3.2.
2. Post-development discharge rates shall not exceed pre-development discharge rates for the 2, 5, 10, and 25-year frequency 24-hour duration storm events. The same hydrologic procedures shall be used in determining both the pre-development and post-development peak flow rates.
3. Post-development discharge velocities shall be reduced to provide non-erosive flow velocities from structures, channels or other control measures, or equal the pre-development 10-year 24-hour storm event flow velocities, whichever is less. These should be considered onsite in addition to 600 ft downstream from the proposed project.
4. For post construction the detention volume from all controls shall be drained from the structure within 72 hours. During construction detention volumes can be temporarily stored to allow settling of particles. During construction basins can be temporarily undercut to handle sediment storage. Upon project finalization pond elevations must be per the approved plans.
5. Infiltration devices shall be required on those sites which do not currently discharge stormwater runoff or have no existing outlet. In such cases, in the post-development condition, devices shall be designed to infiltrate the runoff volume equivalent to the 5-year storm event. For evaluating storm events with a return interval greater than 5 years, the discharge rate from the site shall be limited to (not exceed) that of a site of equivalent size and slope with a SCS Curve Number equal to 39. See Section 3.6.k for more information.

Note: An alternative design for infiltration basins can be found in Appendix O.

6. Watersheds that have documented water quantity problems may have more stringent or modified design criteria determined by the PW/SWD or as dictated by

State and Federal Regulations. Some examples of variable criteria include but are not limited to:

- a. Post-development discharge rates from the entire development area not exceeding pre-development discharge rates for storm frequencies greater than the 25-year storm event,
 - b. Post-development discharge volumes from the entire development area not exceeding pre-development discharge volumes for storm frequencies smaller than the 2-year storm event,
 - c. Reduction of peak flow rates below pre-development levels,
 - d. Downstream channel, culvert, or property improvements.
7. Water quantity/volume waivers may be granted on a case-by-case basis. Final approval of a waiver request will be given at the discretion of the PW/SWD. A water quantity/volume waiver doesn't excuse water quality considerations. A project may be eligible for a waiver from the stormwater management requirements for water quantity/volume control if the applicant can justly verify the following items;
- a. The proposed project will not create any significant adverse effects on the receiving storm water system downstream of the property, and
 - b. The imposition of peak flow rate or volume control for stormwater management would create, aggravate, or accelerate downstream flooding or cause a detrimental impact to the downstream ecosystem.
 - c. The design engineer shall sign the following statement, "The increased flows will not have a significant adverse impact on the downstream and adjacent properties".
8. An analysis shall be required for all development sites disturbing more than 2 acres to determine the impacts on downstream areas based on the 10-and 100-year 24-hour storm events unless a waiver or variance is granted. Downstream analysis shall determine whether the design storm events of interest cause or increase flooding, pollution, or erosion impacts to downstream properties, road crossings, and others areas as directed by the PW/SWD. Applications for permit coverage should discuss this impact, the degree of the impact, and potential solutions. The analysis criteria shall include, but is not limited to:
- a. Existing land use curve numbers shall be used for developed areas outside of the project area.
 - b. The weighted curve number for the developed portion of the site shall be used for all undeveloped upstream areas.

- c. Flows should be routed using an accepted hydrologic and hydraulic method.
- d. Hydraulic step-backwater calculations (Corps of Engineer's HEC-2 or HEC-RAS models or equivalent) may be required by the PW/SWD based on several factors, such as the severity of potential impact and location of project.
- e. The discussions should include the severity of impact on any upstream and proposed storm water quantity or quality structure.

If the downstream analysis determines that the development of a particular site does contribute to flooding, pollution, or erosion problems, then appropriate controls shall be implemented:

- 9. All quantity controls that are also used for water quality control shall have a forebay or screening vault for removal of debris and coarse sediments. The benefit of the forebay is that it inhibits the main wet pond from filling up with large particles, therefore allowing the main pond to maintain its original design volume.
 - a. Forebays shall be placed upstream of the main pond storage area.
 - b. Unless a separate vault is to be used for the forebay, the forebay shall be separated from the larger detention area by barriers or baffles that may be constructed of earth, stones, riprap, gabions, or geotextiles. The barrier and/or baffles act as a trap for coarse sediments and minimize their movement into the main pond.
 - c. Maintenance of forebays will be needed more frequently than the main storage area and all designs, maintenance schedules should consider this need.
- 10. Documentation on the design, installation, and maintenance of stormwater quantity facilities can be found in Paine, J., and Akan, A., (2001), ASCE & WEF (1994), and Mays (2001).

3.3.1 Accepted Quantity Controls

Detention structural controls are used for providing water quantity control and are typically used downstream of other minor structural controls. These structures are designed to provide channel protection, overbank flood protection, and protection against adverse downstream impacts that are related to the increase in peak flow rates and flow volumes from land disturbing activities. Detention structural stormwater controls accepted by PW/SWD are shown in Table 3.4.

Table 3.4: Accepted quantity controls

General Structural Control	Description
Dry Detention/Dry Extended Basins	Dry detention basins and dry extended detention basins are surface storage facilities intended to provide temporary storage of stormwater runoff and releasing it at a designed flow rate to reduce downstream water quantity impacts. These structures are designed to completely drain to a dry condition within 72 hours.
Wet Storm Water Detention Basins <ul style="list-style-type: none"> • Wet Pond • Wet Extended Detention Pond • Micropool Extended Detention Pond • Multiple Pond System 	Wet detention basins are constructed stormwater basins that have a permanent pool or micropool of water. Runoff from each rain event is detained above the permanent pool and released at a designed flow rate to reduce downstream water quantity impacts. Permanent pool depths must be ≥ 4 feet to reduce mosquito breeding.
Multi-purpose Detention Areas	Multi-purpose detention areas are used for one or more specific activities such as parking areas and rooftops. These areas are used to provide temporary storage of runoff. Some of the multi-purpose area such as infiltration trenches or bio-retention areas may also be used for water quality purposes.
Underground Detention	Underground detention is used as an alternative to surface dry-detention basins. They are used in areas that are space-limited where there is not enough adequate land to provide the required detention volume. The underground storage utilizes tanks, vaults, and buried pipes to supply the required storage volume.
Infiltration Basins	Infiltration basins are used to remove runoff from the flow path into the ground. They are used in areas that currently do not discharge stormwater or create runoff only during large storm events.

3.3.2 Design Procedures

This section provides the general procedures for the design of stormwater quantity structures. The following items shall be required for the design of these structures and routing flows through them:

1. Compute the inflow hydrograph for the structure for the 2, 5, 10, 25, and 100-year 24-hour storm events for both the existing and proposed conditions. From this, determine peak flow rates for each storm. Also compute volume from existing conditions for the 2 and 10-year storm events.
2. Compute a stage-storage relationship for the proposed structure. A stage storage-curve defines the relationship between the depth of water and storage volume within the detention facility. Stage-storage and stage-discharge calculations should be included in the engineering calculations.
3. Compute stage-discharge relationship of the outlet control structure(s). A stage-discharge curve defines the flow capacity of a structure at a given stage or elevation. Also compute outlet barrel capacity and discharge velocity for energy dissipation design.
4. Perform routing calculations for the 2, 5, 10, 25, and 100-year storm events.
5. Determine the volume released from the facility at the end of 24-hours.
6. Compare the volume from the existing conditions to the volume released from the facility at the end of 24 hours for the 2-year and the 10-year storm event. The volumes released from the pond for the 2-year and the 10-year storm events should be less than or equal to the volumes from the existing conditions. Compare the two peak discharges. The peak discharge rate from the pond should less than or equal to the peak discharge rate for the pre-development conditions for the 2, 5, 10, and 25-year storm events, unless the PW/SWD allows a tolerance for peak flow matching. Finally, check to make sure the discharge hydrograph from the 100-year storm event does not overtop the banks of the facility.
7. Evaluate the control structure outlet flow velocity and provide velocity control and channel stabilization. Drawings and details should be provided for outlet structures and basin.
8. Concentrated flow from any discharge point shall be returned to the overland flow condition.

3.4 Water Quality Control Requirements

Water quality control is an integral and required component of overall stormwater management systems to preserve the water resources of Lexington County. New development and re-development projects must include controls that treat or otherwise limit the discharge of pollutants. These requirements are due to state and federal requirements. Because this is a requirement of stormwater design, this section provides background information, references, and design standards addressing water quality.

3.4.1 Background of Urban Storm Water Runoff Quality

Table 3.5 provides information on the major sources and associated pollutants that impact the waters of Lexington County.

Table 3.5: Typical stormwater pollutants and sources

Pollutant Source	Pollutants of Concern
Erosion	Sediments and attached soil nutrients (numerous nitrogen and phosphorus forms), organic matter, and other adsorbed pollutants.
Atmospheric Deposition	Hydrocarbons emitted from automobiles, dust, metals, nutrients, and other chemicals released from industrial and commercial activities.
Roadways/Transportation related areas	Hydrocarbons emitted from automobiles, dust, metals,
Construction Sites	Sediment, metals, paint, and wood preservatives.
Manufactured Products (Industrial land uses)	Heavy metals, phenols, and oils from automobiles, Zinc and Cadmium from tire wear.
Lawn and Landscape Maintenance	Fertilizer and pesticides.
Plants and Animals	Plant debris, animal excrement.
Septic Tanks	Coliform bacteria, nitrogen, NO ₃ .
Non-Storm Water Connections	Sanitary sewage, industrial wastewater, commercial discharge, and construction activities.
Accidental Spills	Pollutants of concern depend on the nature of the spill.

Pollutant Source	Pollutants of Concern
Animal Waste Management	Coliform bacteria, nitrates, and phosphorus.
Pesticide Applications	Pollutants of concern depend on the pesticide being used and the type of crop or pest being treated.
Land Disturbance Agriculture	Sediment and attached soil nutrients, organic matter, and other adsorbed pollutants.
Fertilizer Applications	Nitrogen and phosphorus.

Source: U.S. Environmental Protection Agency, June 1992.

3.4.1.1 Suspended solids

The most prevalent form of stormwater pollution is the presence of suspended matter that is either eroded by stormwater or washed off paved surfaces by stormwater. Suspended solids increase the turbidity of the receiving water, thereby reducing the penetration of light, resulting in decreased activity and growth of photosynthetic organisms. Also, elevated concentrations of suspended sediment alters stream nutrient biogeochemistry which impacts nutrient adsorption and desorption, processes very important to control over primary production and overall ecosystem health (Lee, 1996; Dent and Henry, 1999). The increased turbidity also detracts from the aesthetics of natural waters. In addition, the clogging of fish gills has been attributed to the presence of suspended solids. Combined sewer overflows typically contain high suspended solids concentrations. The solids that settle in the receiving water pose long-term threats resulting from their oxygen demand and gradual accumulation of toxic substances (Moffa, 1990), as well as reducing primary production. Sedimentation and other forms of physical separation are often an effective means of removing suspended solids from stormwater.

Sediment is derived from a variety of sources, including erosion from disturbed areas, washoff of sediment deposited on impervious areas, and detachment of sediment due to the increased stream power that comes from increased flow rates and flow durations with urbanization. A significant number of models are available to predict total suspended solids (TSS) contributions from “clean” sediment (i.e. no attached potential pollutants), but few of the models have parameters specific to urbanized areas. Most of the models were developed to deal with agricultural soils, and their application to urban areas is limited.

Models that do have capabilities that have been used for predicting urban clean sediment include SWMM, SEDPRO, SWAT, and SEDCAD models. For the models to be effectively utilized in sizing BMPs, predictions must be made of time varying quantities as well as the size distribution. Those distributions must be of the aggregated particles, not just the primary particles.

3.4.1.2 Oxygen demanding matter and bacteria

Sufficient levels of dissolved oxygen (DO) in the water column are necessary to maintain aquatic life, growth, and reproductive activity, as well as to maintain aerobic conditions. The introduction of stormwater containing oxygen-demanding organic matter can impair the receiving water quality by reducing the DO levels such that it is unable to sustain certain forms of aquatic life and can further cause the water to become foul. Bacteria enter the stormwater drainage system typically from the washoff of animal feces and organic matter from the catchment surface, possibly even disturbed soil. Bacteria also may enter the stormwater system and ultimately natural waters through leaking sewer systems (lateral connections, manholes, and industrial or commercial drains, etc.) and malfunctioning septic system, all of which are termed illicit discharges and illegal by Lexington County Stormwater Management Ordinance. Organic matter, usually in the form of vegetation and detritus, is carried through the conveyance system by the stormwater. Pathogenic bacteria and viruses in stormwater discharges pose human health threats. The removal of pathogenic bacteria is achieved primarily through the process of biological decay and physical-chemical disinfection where practiced. Presence of such bacteria is assumed based on the detection of indicator bacteria such as fecal coliforms or E-coli. The reduction of bacteria in waters of the State has been the focus of TMDL efforts by SCHDEC to date.

3.4.1.3 Nutrients

Nitrogen and phosphorus are plant nutrients that promote the growth of plants and protista such as algae, and are the second leading stressor of impaired rivers and streams and the leading stressor of impaired lakes (US EPA, 1997). Such nutrients contribute to the eutrophication of water bodies resulting in a list of associated liabilities such as decreased oxygen supply, alteration of aquatic life, decreased recreational value (Novotny, 1985).

Nutrients are typically derived from agricultural runoff as well as runoff from chemicals applied to lawns in urbanized areas, runoff from industrial sites, municipal wastewaters (of more concern for combined sewer overflows), or dry fall onto impervious surfaces that is later washed into stormwater. Model studies indicate that the increase in nutrient loading due to increased imperviousness will be dramatic. For example, the increase in the Maryland Chesapeake Bay watershed due to increased urbanization is expected to range from 2 to 20 times the current load, depending on whether residential development is highly restricted or unrestricted (Houlahan, 1992). Nutrients can be removed from stormwater prior to discharge through biological uptake such as by plantings in stormwater quality control ponds.

Most models of nutrient loadings that have an extensive data base included have been based on agricultural and forest operations. These have applicability to washoff from fertilized lawns and forested areas but not to the impervious areas. Models of nutrient loading in urban runoff are typically based on washoff type calculations or user-defined loadings and concentrations, all of which require user-defined constants and relatively simple. A relatively new model called IDEAL, has additional treatment procedures for nutrients loads and removal using isothermic relationships that define adsorbed to dissolved nutrient ratios.

3.4.2 Accepted Water Quality BMPs

In selecting a BMP(s), it is most important to know what pollutants need to be treated to meet water quality goals. With proper planning, installation, and maintenance, BMPs are expected to

reduce pollutant loads to receiving waters, reduce erosion, and provide health and safety benefits. Table 3.6 is average pollutant loadings for various land uses.

Table 3.6. Average Pollutant Loading for Various Land Uses (mg/l)

Land Use	Pollutant Loading (mg/l)											
	BOD	COD	TSS	TDS	TP	DP	TKN	NO ₂ / NO ₃	Pb	Cu	Zn	Cd
Forest/ Rural Open	3	27	51	415	0.11	0.03	0.94	0.80	0.000	0.000	0.000	0.000
Urban	3	27	51	415	0.11	0.03	0.94	0.80	0.014	0.000	0.040	0.001
Agricultural/ Pasture	3	53	145	415	0.37	0.09	1.92	4.06	0.000	0.000	0.000	0.000
Low Density Residential	38	124	70	144	0.52	0.27	3.32	1.83	0.057	0.026	0.161	0.004
Medium Density Residential	38	124	70	144	0.52	0.27	3.32	1.83	0.180	0.047	0.176	0.004
High Density Residential	14	79	97	189	0.24	0.08	1.17	2.12	0.041	0.033	0.218	0.003
Commercial	21	80	77	294	0.33	0.17	1.74	1.23	0.049	0.037	0.156	0.003
Industrial	24	85	149	202	0.32	0.11	2.08	1.89	0.072	0.058	0.671	0.005
Highways	24	103	141	294	0.43	0.22	1.82	0.83	0.049	0.037	0.156	0.003
Water/ Wetlands	4	6	6	12	0.08	0.04	0.79	0.59	0.011	0.007	0.003	0.001

Adapted from NURP (1983), Horner et. al (1994), and Cave et. Al. (1994)

BOD = Biochemical Oxygen Demand	TKN = Total Kjeldahl Nitrogen
COD = Chemical Oxygen Demand	NO ₂ /NO ₃ = Nitrates / Nitrites
TSS = Total Suspended Solids	Pb = Lead
TDS = Total Dissolved Solids	Cu = Copper
TP = Total Phosphorus	Zn = Zinc
DP = Dissolved Phosphorus	Cd = Cadmium

Fecal coliform (FC) concentrations were not provided in the table above due to the large variability. Guidance from SCHDEC and NURP (1983) should be sought when estimating existing and post-development bacteria loads and the reduction requirements.

Lexington County's current approved list of stormwater quality BMPs are listed in Table 3.7. References to BMP selection, effectiveness, and design can be found in SCDHEC (2005), ARC (2001), Schueler (1987), and WEF & ASCE (1998). Guidance on applying BMPs into LID approaches can be found in PGC (1999 a and b). SCDHEC (2005) is provided in Appendix B.

Table 3.7: Accepted quality controls

General Structural Control	Description
Wet Ponds	Wet stormwater ponds are constructed stormwater basins that have a permanent pool or micropool of water. Runoff from each rain event is detained and treated in the pool, and released at a designed rate.
Stormwater Wetlands	Stormwater wetlands are natural or constructed systems used for stormwater management. Stormwater wetlands consist of a combination of shallow marsh areas, open water and semi-wet areas above the permanent water surface.
Bioretention Areas	Bioretention areas are shallow stormwater basins or landscaped areas that utilize engineered soils and vegetation to capture and treat stormwater runoff. Runoff may be returned to the conveyance system or partially exfiltrate into the soil.
Sand Filters	Sand filters are multi-chamber structures designed to treat stormwater runoff through filtration, using a sand bed as its primary filter media. Filtered runoff may be returned to the conveyance system or partially exfiltrate into the soil.
Infiltration Trenches	An infiltration trench is an excavated trench filled with stone aggregate used to capture and allow infiltration of stormwater runoff into the surrounding soils from the bottom and sides of the trench.
Enhanced Grassed Swales	Enhanced swales are vegetated open channels that are explicitly designed and constructed to capture and treat stormwater runoff within dry or wet cells formed by check dams or other structures.
Engineered Devices <ul style="list-style-type: none"> • Vortex Separator • Baffles • Cartridges 	Pre-fabricated controls use the movement of stormwater runoff through a specially designed structure to remove target pollutants. They are typically used on smaller commercial sites and urban

General Structural Control	Description
<ul style="list-style-type: none"> • Skimmers • Bioretention • Gravity Oil-Grit Separator • Filter Material • Sedimentation • Inlet inserts • Constructed wetland uptake. 	<p>hotspots. There are numerous commercial vendors of these structures, but there is limited data on the performance of these structures. Until further research is done and substantial removal efficiencies are published, these structures may require monitoring.</p>

Some structural BMPs have limited applications and are recommended to be used in conjunction with other BMPs. Limited application controls may be used within a system of water quality controls and are very effective pre-treatment structures for the controls listed in Table 3.7. Limited application structural controls should be designed and used only in development situations where regular maintenance is guaranteed. Types of limited stormwater controls are shown in Table 3.8.

Table 3.8: Limited structural controls

Limited Structural Control	Description
<p>Vegetated Filters</p> <ul style="list-style-type: none"> • Filter Strip • Grassed Channels and Swales 	<p>Both filter strips and grassed channels provide filtering of stormwater runoff as it flows across the vegetation. However, by themselves these controls do not consistently obtain adequate sediment and pollutant removal. Both filter strips and vegetated channels shall be used as pretreatment measures or part of a treatment system approach.</p>
<p>Submerged Gravel Wetland Systems</p>	<p>Submerged gravel wetlands use wetland plants in a submerged gravel or crushed rock media to remove stormwater runoff pollutants. These systems should only be used in mid- to high- density environments where other structural controls will be utilized.</p>
<p>Small Sand Filters</p> <ul style="list-style-type: none"> • Surface Sand Filter • Perimeter Sand Filter 	<p>Sand filters are multi-chamber structures designed to treat stormwater runoff through filtration, using a sand bed as its primary filter media. Filtered runoff may be returned to the conveyance system or partially exfiltrated into the soil.</p>

Limited Structural Control	Description
Porous Paver Systems	Porous paver systems consist of open void paver units laid on gravel subgrade to promote stormwater infiltration. Porous pavers provide water quality and quantity benefits.

Regardless of the control, maintenance schedules should be included for each BMP proposed. This will provide adequate planning and cost allocation to the owner and Lexington County.

3.4.3 Design Requirements

3.4.3.1 General Requirements

The following design criteria are established for water quality control and shall be incorporated by the use of BMPs for a given project area unless a specific water quality waiver is granted by the PW/SWD. Incorporation of these requirements shall constitute adequate control of the discharge of pollutants.

1. All sites which disturb five (5) acres or greater shall have permanent BMPs installed. Stormwater discharges to special protection areas with sensitive resources are subject to additional performance criteria (See Section 3.9).
2. Permanent water quality ponds and water quality structures having a permanent pool elevation shall be designed to store the first ½-inch of runoff from the contributing area of the site and release the accumulated water quality volume (WQV) over a minimum period of 24-hours.
3. Permanent water quality structures not having a permanent pool elevation shall be designed to store the first 1-inch of runoff from the contributing area of the site and release the WQV over a minimum period of 24-hours.
4. Engineered devices that are designed to treat the runoff volume from a project area may be substituted for a permanent water quality pond, if appropriate.
5. BMPs used strictly for water quality that will be capturing five (5) or more acres shall have a pretreatment device as part of the BMP or treatment system. This may include forebays, vaults, or other devices that remove debris and coarser sediments from the drainage system.
6. Projects that discharge either directly or indirectly into an impaired waterbody as determined by the existence of an adopted TMDL by SCDHEC or through SCDHEC's listing of the waterbody on the latest 303(d) list shall be required to reduce pollutant loads so as to meet applicable water quality standards. More background information is covered in Section 3.9. This will require the installation

and implementation of measures which are expected to adequately reduce pollutant loads to levels required by the TMDL or prevent future impairments as required by the current 303(d) list.

If the site disturbs less than 25 acres, an evaluation of the BMPs chosen to control the release of pollutants must be provided. Such evaluations may reference published values on BMP effectiveness. If greater than 25 acres, a comprehensive quantitative and qualitative analysis shall be provided, and include at a minimum calculations that show:

- a. a sites pollutant load for all pollutants of concern (see Table 3.5),
 - b. the trapping effectiveness of the chosen BMPs based on County rainfall statistics and soil types, and
 - c. the runoff discharged through the last water quality BMP shall have a water quality level equal to or better than the in-stream standard or as required by an applicable TMDL.
7. All BMPs must have a maintenance plan. Suggested schedules and routine activities are provided in SCDHEC (2005).
 8. A credit system may be available from the PW/SWD that offers alternatives on how a site meets these water quality requirements. However, state minimum stormwater criteria must be met.
 9. The PW/SWD reserves the right to require specific effluent limits for any pollutant from a site if necessary to ensure the water quality standards and other local, state, and federal water quality regulations are met. The PW/SWD also reserves the right to not allow credits at certain sites.
 10. Disconnected roof drains/impervious are areas directing stormwater runoff from rooftops towards pervious areas where it is allowed to filter through vegetation and other landscaped material and infiltrate into the soil.
 11. Grass and porous pavements allow for the reduction of paved areas by incorporating areas that are infrequently used, providing water quality benefits through increased infiltration. Grass and porous pavements should be avoided in high vehicular traffic areas.
 12. Literature, signage, or other documentation shall be provided to owners and HOAs to educate and train themselves on the impact they can have on water quality and the activities necessary to maintain structural controls, as appropriate. These efforts are particularly critical in LID designs.

3.4.3.2 Design Procedures

1. Determine an appropriate, accepted BMP(s) needed for the site, considering the land use, pollutants of concern (Table 3.5), soils, maintenance requirements, and location in relation to waters of the State and any impairments that may exist.
2. If the receiving water of the project is impaired or has an adopted TMDL the applicant must show that water quality standards are being met for the impairment. This analysis must be quantitative and qualitative for sites that disturb more than 25 acres. The appropriate steps include:
 - a. Calculate the load for the pollutant(s) of concern. Another possible equation is the Schuler Simple Method (Schueler 1987). This method is based on an extensive database obtained in Washington, D.C. for the National Urban Runoff Program (NURP). The Simple Method estimates pollutant loads from urban development by the following equation:

$$L = 0.227(Q P_j R_v C A) \quad \text{Equation 1}$$

Where:

L = Pollutant load in pounds per desired time interval,

Q = Runoff depth,
 ½-inch for wet ponds, some wetlands,
 1-inch for all other BMPs,

P_j = Fraction of rainfall events over the time interval that produce runoff

 P_j = 1 for a single event

 P_j = 0.9 for larger time intervals (months, years),

R_v = Volumetric runoff coefficient expressing the fraction of rainfall converted to runoff (See Equation 2),

C = Event mean pollutant concentration in mg/l (See Table 3.6),

A = Total area of site in acres (areas < 640 acres are recommended for this method).

The most important factor affecting the volumetric runoff coefficient (**R_v**) is the imperviousness of the watershed, **I**, in percent. An empirical relationship was developed that relates **R_v** and **I** as:

$$R_v = 0.05 + 0.09(I) \quad \text{Equation 2}$$

The rainfall depth, **P**, was chosen such that a large percentage of storm events will be captured, with larger events only partially captured or bypassed. Greater than 80% of the average annual rainfall amount in Lexington County occurs from storm events with a total depth equal to or greater than 1-inch. The 1-inch from pervious areas is the result of approximately 4.5-inches of total rainfall, but it only takes a rainfall of 1.2 inches on impervious surfaces.

Other loading functions, such as in SEDPRO and SEDCAD for eroded particles or common buildup and washoff equations may be used.

- b. Select appropriate BMPs from Tables 3.7 and the BMP Uses tables in the Appendix J.
 - c. Compute BMP effectiveness for removing pollutants of concern, showing at a minimum that the concentration of the pollutants of concern from the last BMP meets applicable water quality standards.
3. For other applicable sites and for the design of all BMPs, the minimum design criteria in section 3.4.3.1.1-5 must be met.
- a. If the BMP is to capture runoff from 5 or more acres, design a forebay or vault. Guidance on this aspect can be found in SCDHEC (2005) and ARC (2001).
 - b. Calculate the water quality volume using the following equation.

$$WQV = \frac{Q * DA}{12} \quad \text{Equation 3}$$

Where:

WQV = Water quality volume (acre-feet)

Q = runoff depth inches (½ for permanent pool structures, 1.0 for dry structures)

DA = Drainage area to water quality BMP (acres). Runoff from the entire site must be captured in a water quality BMP, unless otherwise allowed by the PW/SWD (e.g. credits).

- c. Unless already known from the quantity calculations detailed in section 3.3.2, compute stage-storage and stage-discharge relationships of the outlet control structure(s).
- d. Perform routing calculations for the 10-year, 24-hour storm event through the BMP. These may be done by hand, or may be done by using a storage routing computer model.
- e. Determine if the entire WQV was released before the 24-hour period. If it does, the outlet structure is too large or the pond is too small, try again. Resize outlet structure.
- f. Repeat Steps d-e until entire volume is not released prior to 24-hours.
- g. For engineered devices, alternative calculations other than detailed here should be provided. SCDHEC has accepted some such devices as providing

adequate treatment as compared to capturing and detaining the 1-inch storm event.

- h. Provide all calculations in submittal package in a cohesive, easy to follow organization.

3.4.4 Water Quality Buffer Requirements

Water quality buffers are required along all perennial and intermittent streams, waterways, shorelines and wetlands as identified on a 7.5 USGS quadrangle map, USACE, or as determined by the PW/SWD

A water quality buffer is an area of original or re-established vegetation that borders streams, rivers, ponds, lakes, wetlands, and seeps. Buffers are most effective when stormwater runoff is flowing into and through the buffer zone as shallow sheet flow, rather than concentrated flow such as channels, gullies, or wet weather conveyances. Therefore, it is critical that design of all development include management practices, to the maximum extent practical, that will result in stormwater runoff flowing into the buffer zone as shallow sheet flow.

Water quality buffers provide numerous environmental protection and resource management benefits including:

1. Restoring and maintaining the chemical, physical and biological integrity of the water resources,
2. Removing pollutants delivered in urban stormwater,
3. Reducing erosion and controlling sedimentation,
4. Stabilizing stream banks,
5. Providing infiltration of stormwater runoff,
6. Maintaining base flow of streams,
7. Contributing the organic matter that is a source of food and energy for the aquatic ecosystem,
8. Providing tree canopy to shade streams and promote desirable aquatic organisms,
9. Providing riparian wildlife habitat, and
10. Furnishing scenic value and recreational opportunity.

3.4.4.1 Intent

It is the intent of the PW/SWD to establish minimal acceptable requirements for the design of buffers to protect the streams, wetlands and floodplains of the County of Lexington; to protect the water quality of watercourses, reservoirs, lakes, and other significant water resources; to protect riparian and aquatic ecosystems; and to provide for the environmentally sound use of the County's land resources.

3.4.4.2 Applications

1. This shall apply to all proposed development except for that development which meets exemptions in Section 3.4.4.3 and/or variance criteria in Section 3.4.4.12.
2. This shall apply to all surface mining operations except active surface mining operations which are operating in compliance with an approved SCDHEC surface mining permit. A copy of the approved surface mining permit shall be provided to PW/SWD.
3. This shall apply to the construction of agricultural structures as stated in Section 3-2.d of the Stormwater Management Ordinance.
4. Except as provided in Sections 3.4.4.3, and 3.4.4.12, this shall apply to all parcels of land, structures and activities which are causing or contributing to:
 - a. Pollution, including non-point pollution, of the waters of Lexington County,
 - b. Erosion or sedimentation of stream channels,
 - c. Degradation of aquatic or riparian habitat,

3.4.4.3 Exemptions

1. Ephemeral streams, ditches, manmade ponds, and lakes outside of natural hydrologic connectivity shall not be subject to Section 3.4.4.
2. Any existing structure or structure under construction located within the buffer area provided the land owner can document prior existence.
3. The addition or expansion to an existing structure provided it does not result in an increase in the total impervious area within the buffer area.
4. Activities associated with emergency operations, such as hazardous materials removal, flood or fire control, evacuations, and storm damage clean up.
5. If any portion of a parcel proposed for development lies within an area designated on an officially adopted Trails and Greenway Master Plan Map as proposed trail or greenway, the developer shall construct the designated improvements in accordance with County standards and dedicate such land to the County.
6. Single family parcels that are not part of a larger common development.

3.4.4.4 Selection of Buffers

3.4.4.4.1 Stream Buffers

Stream buffers shall be considered a “no disturb zone” along perennial and intermittent streams as defined by USGS Quad Maps. Vegetation cannot be disturbed, removed or replanted unless a buffer restoration plan has been approved by the PW/SWD. Section 3.4.4.8 provides requirements to expand the buffer widths depending on slopes, water pollution hazards, or other uses that may contribute to water quality degradation. In defining the limits of stream buffers, top of bank is defined as the uppermost limit of the active channel of a stream during “bank full” conditions, typically marked by a break in slope.

The buffer width shall be calculated as follows:

1. Along perennial streams, shown as a solid blue line on the USGS Quad Map, not associated with a floodplain or wetlands, the buffer shall be at least 100 feet perpendicular from the top of bank on each side of the waterway.
2. In areas where a floodway profile has been computed along a perennial stream (AE Zones) as part of an approved flood study, the buffer area shall be the width of the floodway if the floodway is greater than or equal to 100 feet. If the width of the floodway is less than 100 feet from the top of bank, the distance to bring the buffer to 100 feet shall be added. (i.e. If the floodway is 50 feet then an additional 50 foot of buffer must be added for total distance of 100 feet from top of bank). If the width of the floodway is greater than 100 feet this area can be counted as the required buffer width.
3. In areas where a floodway profile has not been computed along a perennial stream (A Zones) the developer shall perform a flood study, determine the floodway and follow the buffer requirements outlined above.
4. Along intermittent streams, shown as a dashed blue line on the USGS Quad Map, the buffer shall be at least 50 feet perpendicular from the top of bank on each side of the waterway. If these streams have associated flood as described above the same requirements would apply to have a total width of 50 feet.
5. For delineated wetland areas associated with perennial streams; if the delineated wetland is less than 100 feet from the top of bank, the distance to bring the buffer to 100 feet must be added. (i.e. If the wetland area is 50 feet then an additional 50 foot of buffer must be added for total distance of 100 feet from top of bank). This buffer width is independent of any wetland offset requirements of the USACE.
6. For delineated wetland areas associated with intermittent streams; if the delineated wetland is less than 50 feet from the top of bank, the distance to bring the buffer to 50 feet must be added. (i.e. If the wetland area is 25 feet then an additional 25 foot of buffer must be added

for total distance of 50 feet from top of bank). This buffer width is independent of any wetland offset requirements of the USACE.

7. For wetland areas not associated with perennial, intermittent streams, or floodway the buffer shall be the extent of the wetland area plus an additional 50 feet perpendicular beyond the wetland edge.

3.4.4.4.2 Stream Buffer Management and Maintenance

The function of the stream buffer is to protect the physical and ecological integrity of the waterway, to reduce flooding potential, and to filter runoff from all development. The objective of a stream buffer is undisturbed native vegetation.

- A. Management of the stream buffer includes specific limitations on alteration of the natural conditions. The following practices and activities are restricted within stream buffer, except with prior approval by the PW/SWD:
 1. Clearing or grubbing of existing vegetation,
 2. Clear cutting of vegetation,
 3. Soil disturbance by grading, stripping, or other practices,
 4. Filling or dumping,
 5. Use, storage, or application of pesticides, herbicides, and fertilizers,
 6. Conversion of vegetation from native to exotic species, and
 7. Motor vehicles are not permitted in stream buffers unless during the installation of certain utilities permitted in the buffer zone,
- B. The following structures, practices, and activities are permitted in the stream buffer, subject to prior approval of the PW/SWD, and when specific design or maintenance features are adhered to:
 1. Stream crossings and utilities:
 - a. An analysis needs to be conducted to ensure that no economically feasible alternative is available;
 - b. The right of way should be the minimum width needed to allow for maintenance access and installation;
 - c. The angle of a crossing shall be perpendicular to the stream or buffer in order to minimize clearing requirements;
 - d. The minimum number of crossings should be used within each development, and no more than one crossing is allowed for every 1,000 linear feet of buffer zone. Where possible, the design of roadways and lots within a development should be aligned

such that all streams are either to the rear or the side of individual lots, never along the front.

2. Transportation right-of-ways, pedestrian crossings, public access, boat ramps, docks, fishing platforms, unpaved paths (i.e. trails and greenways), and stream bank stabilization efforts.
3. Utilities are allowed and shall be installed a minimum distance of 25 feet measured perpendicular from the top of bank within the buffer area.

C. In order to maintain the functional value of the stream buffer, indigenous vegetation may be removed as follows:

1. Dead, diseased, or dying trees that are in danger of falling and causing damage to dwellings or other structures may be removed with approval from the PW/SWD;
2. Debris in the buffer area that is caused by storm damage may be removed; and
3. Invasive plant species may be removed if they are replaced by native species that are equally effective in retarding runoff, preventing erosion and filtering non-point source pollution from runoff. A buffer restoration plan for removal of invasive species must be approved by the PW/SWD.

3.4.4.5 Shoreline Buffers

Shoreline buffers shall be considered an area of managed vegetation adjacent to shorelines with hydrologic connectivity (stream leading into/out of the pond/lake or obvious spring input).

The shoreline buffer width shall be 50 feet perpendicular from the shoreline. For ponds and lakes, the shoreline shall be defined as the 100 yr high water elevation. For Lake Murray the buffer shall be measured from the 360 elevation.

3.4.4.5.1 Shoreline Buffer Management and Maintenance

The function of the shoreline buffer is to protect the physical and ecological integrity of the water body by providing a functional distance to reduce flooding potential, reduce erosion, sedimentation, and filter runoff between development and the water body.

- A. Management of the shoreline buffer includes specific limitations on alteration of the natural conditions. The following structures, practices and activities are restricted in the shoreline buffer unless prior approval is granted by the PW/SWD:
1. Septic systems;
 2. Permanent structures;

3. Impervious cover, with the exception of paths;
 4. Soil disturbance by grading, stripping or other practice;
 5. Filling or dumping;
 6. Stormwater management facilities;
 7. Use, application, or storage of pesticides or herbicides except for the spot spraying of noxious weeds or other non-native species consistent with approved agency recommendations. (Lexington County, State Forestry Commission, SCE&G Land Management);
- B. The following structures, practices, or activities are permitted in the shoreline buffer subject to the prior approval of the PW/SWD:
1. Biking or hiking paths;
 2. Recreational uses as approved by the PW/SWD;
 3. Limited tree or underbrush clearing with approval from the PW/SWD;

34.4.6 Water Quality Buffer Plat Requirements

All preliminary, bonded and final plats prepared for recording and all right-of way-plats shall clearly:

1. Show the extent of any stream or shoreline buffer on the subject property by metes and bounds;
2. Label the stream and shoreline buffer;
3. Provide a note to reference all buffers stating: "There shall be no clearing, grading, construction or disturbance of vegetation except as permitted by the PW/SWD,";
4. Provide a note to reference any protective covenants governing all buffer areas stating: "Any buffer shown on the plat is subject of protective covenants which may be found in the land records and which restrict disturbance and use of these areas,";
5. If the buffer area will not be part of an individual lot then ownership must be stated by identifying who is the responsible party.
6. Provide location of permanent boundary marker signs.

3.4.4.7 Design Requirements

The buffer plan must be submitted in conjunction with the sediment and erosion control plan, SWPPP Document, and all applicable calculations for a land disturbance permit.

It is recommended that the buffer be marked off with a warning barrier (orange safety fence) to show that no disturbance is allowed in the buffer area.

The PW/SWD requires that the following steps be taken during the site plan development and site construction process to protect water quality buffers during construction:

1. Water quality buffers must be clearly identified on all stormwater management plans and construction drawings and marked with the statement "Water Quality Buffer. Do Not Disturb"
2. Water quality buffers cannot be encroached upon or disturbed during project construction, unless in accordance with Section 3.4.4.3, Section 3.4.4.12 or unless they are being established, restored, or enhanced in accordance with an approved Buffer Enhancement Plan.
3. Water quality buffers must be clearly marked with warning barrier before the pre-construction conference. The marking shall be maintained until completion of construction activities. All contractors and others working on the construction site must be made aware of the existence of the buffer(s) and the restrictions on disturbing the buffer(s).
4. All areas of the water quality buffer, including stream banks, must be left in the existing condition upon completion of construction activities. Should construction activities associated with development cause degradation to stream banks all eroding, bare or unstable stream banks shall be restored to existing conditions.
5. If any trees are allowed to be removed, show the tree location and provide a note stating that the tree must be hand cleared,
6. The locations of all signage must be clearly shown on plans,
7. A narrative stating the extent of the buffer areas, including any allowed disturbance in the buffer areas (this should be in the narrative as well as in the SWPPP Document) must be included with the plans,
8. A double row of silt fence (with metal posts and wire backing) shall be shown on the upstream side of the applicable buffer area(s),
9. The stream buffer shall be shown and labeled on the engineering plans, preliminary, bonded and final plat.
10. If the stream buffers are dedicated to Lexington County, placed in a conservation easement, or turned over to a Homeowners Association, the buffers shall be maintained in accordance

with the maintenance and inspection requirements for permanent storm water management structures outlined in Chapter 2

- a. If the buffer is dedicated to Lexington County:
 - i. All property lines shall terminate at the water quality buffer
 - ii. Access easements shall be a minimum twenty (20) foot wide to allow maintenance of the buffer. Access points for these easements will be coordinated with storm drainage easements during the plan review process.
- b. If placed in a conservation easement or if the easement is held by a viable third party, such as a land trust, land management company or utility the organization shall:
 - i. Have the legal authority to accept and maintain such easements;
 - ii. Be bona fide and in perpetual existence;
 - iii. Have conveyance instruments that contain an appropriate provision for re-transfer in the event the organization becomes unable to carry-out functions;
- c. If given to a Home Owners Association (HOA) the following criteria must be met:
 - i. Membership in the HOA is mandatory and automatic for all homeowners for the subdivision and their successors;
 - ii. The HOA shall have lien authority to ensure the collection of dues from all members;
 - iii. The HOA assumes the responsibility for protecting, monitoring and maintaining the area as an undisturbed natural area, in perpetuity;

Shoreline buffers shall be shown and labeled on the engineering plans. Shoreline buffers shall be maintained by the owner in accordance with the maintenance and inspection requirements for permanent storm water management structures outlined in Chapter 2. Shoreline buffers may be deeded to Lexington County, placed in a conservation easement, or given to the HOA as outlined in Section 3.4.4.6.10.

3.4.4.8 Water Quality Buffer Width Adjustments

Adjustments to the buffer width shall be made for the following conditions:

- 1. If there are 15% to 24% slopes which are within the required buffer area, the buffer width must be adjusted to include additional ten (10) feet.

2. If there are 25% or greater slopes which are within the required buffer area width, the buffer width must be adjusted to include additional twenty-five (25) feet.
3. If the adjacent land use involves drain fields from on-site sewage disposal and treatment system (i.e., septic systems), subsurface discharges from a wastewater treatment plant, or land application of bio-solids or animal waste, the buffer area width must be adjusted to include an additional twenty-five (25) feet.
4. If the land use or activity involves the storage of hazardous substances or petroleum facilities, the buffer area width must be adjusted to include an additional fifty (50) feet.
5. If the land use or activity involves raised septic systems or animal feedlot operations, the buffer area width must be adjusted to include an additional one-hundred (100) feet.
6. If the land use or activity involves solid waste landfills or junkyards, the buffer area width must be adjusted to include an additional two-hundred (200).

The PW/SWD has the ability to reduce the buffer width adjustments on a case-by-case basis.

3.4.4.9 Water Quality Buffer Averaging

This section outlines the criteria for buffer averaging on new and redevelopment sites. Buffer averaging can be utilized to adjust the required buffer width, allowing some flexibility for site development. Using buffer averaging, the width of the buffer can be varied with the criteria stated in this manual, as long as a minimum average width of 100' for perennial streams and 50' for intermittent streams and shorelines are maintained.

3.4.4.9.1 Requirements and Policies

The following criteria must be met in order to utilize buffer averaging on a development site:

1. Buffer averaging is required for water quality buffers that have stream crossings.
2. An overall average buffer width of 50-100', depending on the water buffer requirement, must be achieved within the boundaries of the property to be developed.
3. The average width must be calculated based upon the entire length of stream bank or shoreline that is located within the boundaries of the property to be developed. When calculating the buffer length, the natural stream channel should be followed.
4. Stream buffer averaging shall be applied to each side of a stream independently. If the property being developed includes both sides of a stream, buffer averaging can be applied to both sides of the stream, but must be applied to both sides of the stream independently.

5. The total width of the buffer shall not be less than twenty-five (25) feet, or the width of the floodway at any location, except at approved stream crossings. Those areas of the buffer having a minimum width of twenty-five (25) feet (or less at approved stream crossings) can comprise no more than fifty (50) percent of the buffer length.

3.4.4.9.2 Areas Where Buffer Averaging is Prohibited

Buffer width averaging is prohibited in developments that have, or will have after development, the land uses listed below:

1. Developments or facilities that include on-site sewage disposal and treatment systems (i.e., septic systems), raised septic systems, subsurface discharges from a wastewater treatment plant, or land application of bio-solids or animal waste;
2. Landfills (demolition landfills, permitted landfills, closed-in-place landfills);
3. Junkyards;
4. Commercial or industrial facilities that store and/or service motor vehicles;
5. Commercial greenhouses or landscape supply facilities;
6. Developments or facilities that have commercial or public pools;
7. Animal care facilities, kennels, and commercial/business developments or facilities that provide short-term or long-term care of animals;
8. Other land uses deemed by the PW/SWD to have the potential to generate higher than normal pollutant loadings.

3.4.4.9.3 Example Calculation

This section provides an example calculation of water quality buffer averaging. A development site is bounded by 800 linear feet of a perennial stream, measured following the stream channel. Only one side of the stream is located within the boundaries of the site to be developed.

Step 1. Calculate the total required area of the buffer.

The total linear length of the buffer is 800 feet (ft).

The required width of the buffer (without averaging) is 100 ft.

Total required area of buffer =length of buffer x width of buffer
 =800 ft x 100 ft
 =80,000 ft²

Step 2. Calculate maximum allowed length of buffer that has the minimum allowed buffer width:

Lexington County allows a maximum of 50% of the total length of the buffer to have a width of 25 feet. Step 2 will determine the maximum length of buffer that can have the minimum allowed buffer width of 25 feet.

$$\begin{aligned}\text{Maximum length of 50 ft buffer} &= \text{length of buffer} \times 50\% \\ &= 800 \text{ ft} \times 50\% \\ &= 400 \text{ linear feet}\end{aligned}$$

Therefore, 400 linear feet of the buffer can have a minimum width of 25 feet.

Step 3. Calculate total area of buffer that has the minimum allowed buffer width and determine remaining buffer area required.

$$\begin{aligned}\text{Total buffer area provided} &= \text{Length of buffer @ 25 ft} \times 25 \text{ ft width} \\ &= 400 \text{ ft} \times 25 \text{ ft} \\ &= 10,000 \text{ ft}^2\end{aligned}$$

$$\begin{aligned}\text{Available buffer area remaining} &= \text{Total required area of buffer} - 10,000 \text{ ft}^2 \\ &= 80,000 \text{ ft}^2 - 10,000 \text{ ft}^2 \\ &= 70,000 \text{ ft}^2\end{aligned}$$

Step 4. Determine the width of remaining buffer.

$$\begin{aligned}\text{Length of remaining buffer} &= \text{Total length} - \text{Length of buffer @ 25 ft width} \\ &= 800 \text{ ft} - 400 \text{ ft} \\ &= 400 \text{ ft}\end{aligned}$$

$$\begin{aligned}\text{Width of remaining buffer} &= \text{Available buffer area remaining} / \text{Length of remaining} \\ \text{buffer} &= 70,000 \text{ ft}^2 / 400 \text{ ft} \\ &= 175 \text{ ft}\end{aligned}$$

Therefore, 400 linear feet of buffer will have a minimum 25 ft width and an additional 400 linear feet of buffer will have a minimum width of 175 ft, with an overall buffer width average of 100 ft.

If more variation in the buffer width is desired, steps 3 and 4 can be repeated using variable buffer widths until an average standard width of 100 feet is achieved keeping the total required area of the buffer constant.

3.4.4.10 Signage

For subdivisions permanent boundary marker signs are required for stream buffers prior to bonding of the subdivision and/or finaling the subdivision with the intent to transfer property. For commercial property permanent boundary marker signs are required prior to the issuance of a Certificate of Occupancy (CO). Permanent boundary markers are required to ensure that property owners are aware of the buffer. Permanent boundary markers are recommended, but not required, in shoreline buffers. The PW/SWD has the authority to require the person or entity responsible for permanent maintenance of the buffer to replace boundary markers that have been removed or destroyed. The following general requirements shall apply to buffer boundary markers:

1. Generally, buffer boundary markers shall be located on the landward edge of the buffer, and at other locations which will approximately delineate the buffer boundary. For commercial developments, markers shall be posted every 100 feet along the buffer boundary. For subdivisions where multiple lots are located along the buffer, it is recommended that a buffer boundary marker be located at the intersection of every other lot line with the landward edge of the buffer.
2. Buffer boundary markers shall include the statement "Water Quality Buffer-Do Not Disturb".
3. Where possible, the markers should be mounted to a tree larger than three (3) inches in diameter. Where it is not possible to mount the marker to a tree, a treated wood, or metal, signpost must be used. The post must extend below the ground surface at least twenty-four (24) inches.
4. The boundary markers must be mounted between four (4) and six (6) feet above the ground surface.
5. The boundary markers must be at least twelve by eighteen inches (12"x 18").
6. Buffer boundary markers may be purchased from the PW/SWD or from another vendor.

3.4.4.11 Buffer Restoration and Enhancement Plans

Buffer restoration is required when a buffer is disturbed without prior approval from the PW/SWD. A developer or property owner may also wish to enhance a buffer to bring it closer to an optimal, undisturbed native forest condition. Prior to reestablishing or planting the buffer, a restoration or enhancement plan must be submitted to and approved by the PW/SWD.

3.4.4.11.1 Buffer Restoration and Enhancement Plan Requirements

Buffer restoration and/or enhancement plans must include the following:

1. A drawing or plan that shows the location of the buffer in relation to the existing or planned development and to the buffered waterway; the disturbance limits for the planned buffer restoration; direction of flow of runoff from the site and flow within the water feature; erosion prevention and sediment control measures to be installed

to protect the waterway; any existing or proposed stream crossings; existing or proposed stream bank stabilization measures; access to a water source for the purposes of watering vegetation; and other pertinent information. For large scale restoration and enhancement projects the plan(s) must be stamped by a registered landscape architect.

2. A plan in visual and a narrative that describe the vegetation plan for the buffer; stream buffers must be planted with native trees, shrubs, and grasses that will not be mowed. Suitable native plants may be found in Appendix P of this Manual
3. The schedule for when plantings will occur and a two year survival guarantee provided by the responsible party.

3.4.4.12 Variances

No variance shall be granted to the undisturbed buffer unless the PW/SWD (or, the Planning Commission in the event of an appeal) determines that a hardship exists and relief meets the general purpose and intent of this manual. No relief of the undisturbed buffer area requirements shall be allowed on any USGS blue line stream within a water quality Special Protection Area as defined in Section 3.9.

In granting a request for a variance, the PW/SWD or Planning Commission may require site design, landscape planting, fencing, the placement of signs, and the establishment of water quality best management practices in order to reduce adverse impacts on water quality, streams, wetlands, and floodplains.

Variance requests shall only be considered if a request meets any of the criteria listed below.

3.4.4.12.1 Buffer Variance Criteria:

1. The project involves construction of:
 - a. One single family home for residential use by the owner of the property;
 - b. The property has an unusual shape or topography of the property and there is no opportunity to develop under any reasonable design configuration;
2. The project involves the construction or repair of a structure which, by its nature, must be located within the buffer:
 - a. Dams;
 - b. Public water supply intakes;
 - c. Waste water discharges;
 - d. Docks, and boat launches;
 - e. Stabilization areas of public access to water;
 - f. Buffer intrusion is necessary to provide access to the property.

- g. Project will:
 - i. Require a Wetland Permit from the US Army Corps of Engineers (COE) for impacts to jurisdictional wetlands, and;
 - ii. The COE has approved a mitigation plan, and;
 - iii. Implementation of the plan in a 404 permit condition;

3.4.4.12.2 Buffer Variance Submittal Requirements

The applicant shall submit a written request for a variance to the PW/SWD. The request shall include specific reasons justifying the variance and any other information necessary to evaluate the proposed variance request. The PW/SWD may require an alternative analysis that clearly demonstrates that no other feasible alternative exist and that minimal impact will occur as a result of the project or development.

The PW/SWD shall make a determination and decision concerning the variance request. An appeal may be made to the Planning Commission. An appeal of the PW/SWD decision shall be filed in writing within 30 days after the final decision. The Planning Commission shall make all final determinations and decisions.

3.4.4.13 Inspections, Violations, Enforcement and Penalties

Inspections shall be carried out as outlined in Chapter 5 of this manual. Violations of the water quality buffer requirements will follow the enforcement and penalty procedures outlined in Chapter 5 of this manual.

3.5 Sediment and Erosion Control Requirements

PW/SWD requires that a sediment and erosion control plan (SECP) be submitted and approved prior to initiating construction on land disturbing activities that are in excess of 5,000 square feet, require a building permit, or as otherwise directed by PW/SWD. This plan describes the practices and controls that will be used during and after construction to meet the following goals:

1. Minimize the extent and duration of disturbed soil exposure,
2. Protect off-site and downstream locations, drainage systems and natural waterways from the impacts of erosion and sedimentation,
3. Limit the exit velocities of the flow leaving the site to non-erosive or pre-development conditions, and
4. Design and implement an ongoing inspection and maintenance plan.

3.5.1 Allowed SECP BMPs

The various types of SECP BMPs that are acceptable for use in Lexington County are presented in this section. These fall into the following categories: erosion prevention measures, temporary sediment control measures, runoff controls and conveyance measures and temporary and permanent vegetation measures.

3.5.1.1 Erosion prevention measures

Erosion prevention measures shall be used during and after construction. Measures that fall into this category along with their preferred application are provided in Table 3.9. Details on each of these measures are not discussed in detail in the Manual. Guidance documents that should be referenced as necessary include: SCDHEC (2003), Haan, C. T., Barfield, B. J., and Hayes, J. C. (1995) and Shwab, Glenn O. and Richard K. Frevert (1985). Other practices, such as engineered devices, will be allowed as long as sufficient evidence is presented as to its effectiveness. Standard drawings, if available, can be found in Appendix I.

Table 3.9 Erosion Prevention BMP Suggested Uses

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Erosion Prevention Measures	X	X	X	X	X	X	X
Surface Roughening	X		X				
Bench Terracing	X		X				
Temporary Seeding	X		X		X	X	X
Mulching	X				X	X	
Erosion Control Blankets (ECB) and Turf Reinforcement Mats (TRM)	X	X	X			X	
Final Stabilization	X		X		X		X
Topsoiling			X		X		
Permanent Seeding and Planting of Grasses	X		X		X		X
Permanent Ground Cover Plants	X		X				X
Sodding	X		X		X		X
Riprap or Aggregate	X	X	X				
Outlet Protection		X		X			X
Dust Control					X	X	X
Polyacrylamide (PAMs)	X		X	X	X	X	X

3.5.1.2 Temporary sediment control measures

Lexington County emphasizes preventative measures as the main control to protect against erosion, both during and following construction. However, there are typically instances where

erosion prevention measures alone do not provide sufficient control. For these situations, temporary sediment controls shall be implemented to control the migration of eroded sediment off site. The sediment control measures are typically only applicable as practices for use during construction. One or more of the measures should be utilized as appropriate during the project's construction phase. Table 3.10 contains a list of some of the suggested controls of this type along with their intended use. Details on these and others measures are not discussed in detail in the Manual, however, guidance can be found in Haan, Barfield, and Hayes (1995) and Appendix C in SCDHEC (2003). Other practices, such as engineered devices, will be allowed as long as sufficient evidence is presented as to its effectiveness. Standard drawings, if available, can be found in the Appendix I.

Table 3.10 Temporary Sediment Control BMP Suggested Uses

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Temporary Sediment Control Structures	X	X	X	X	X	X	X
Storage Volumes and Maintenance Schedules		X		X			X
Temporary Sediment Basin		X	X	X			X
Multipurpose Basin		X	X	X			X
Temporary Sediment Trap		X	X				X
Silt Fence	X	X					X
Rock Ditch Check			X				X
Stabilized Construction Entrance					X		X
Storm Drain Inlet Protection		X		X			X
Vegetated Filter Strips		X					X
Rock Sediment Dike		X	X				X

3.5.1.3 Runoff controls and conveyance measures

This category of SECP BMPs should be used as necessary during and following construction. Suggested varieties and their corresponding uses are provided in Table 3.11.

Table 3.11 Runoff Control and Conveyance BMP Suggested Uses

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Pipe Slope Drains	X		X				
Temporary Stream Crossing		X	X				X
Runoff Conveyance Measures	X					X	X
Construction De-watering		X		X	X	X	
Level Spreader			X		X		X
Subsurface Drains			X		X		

3.5.1.4 Temporary vegetation

Plant Selection

Plant seed selection should be based on the type of soil and the season of the year in which the planting is to be done. Tables 3.12 and 3.13 should be used if you plan to use conventional tillage methods (plowing, seedbed preparation, hydroseeding, etc). If you need a fast growing crop to nurse your permanent specie or species, then use the mix rate. Failure to carefully follow agronomic recommendations often result in an inadequate stand of temporary vegetation that provides little or no erosion control.

Tillage

If the area has been recently plowed, no tillage is required other than raking or surface roughening to break any crust that has formed and to leave a textured surface. If the soil is compacted less than 6-inches, it should be disked for optimal germination.

Soil Testing

Information and test provider is available from the PW/SWD and the Soil and Water Conservation District Office.

Lime

Lime is not required for temporary seeding unless a soil test shows that the soil pH is below 5.0. It may be desirable to apply lime during the temporary seeding operation to benefit the long-term permanent seeding. Apply a minimum of 1.5 tons of Lime/acre (70 pounds per 1000 square feet) if it is to be used.

Fertilizer

A minimum of 500 pounds per acre of 10-10-10 fertilizer (11.5 pounds per 1000 square feet) or equivalent should be applied during temporary seeding unless a soil test indicates a different

requirement. Fertilizer and lime (if used) should be incorporated into the top 4-6 inches of the soil by disking or other means where conditions allow.

Seeding

The surface of the soil should be loosened just before broadcasting the seed. Seed should be applied evenly by the most convenient method available for the type of seed to be used and the location of the temporary seeding. Typical application methods include but are not limited to cyclone seeders, rotary spreaders, drop spreaders, broadcast spreaders, hand spreaders, cultipacker seeder, and hydro-seeders. Cover applied seed by raking or dragging a chain, and then lightly firm the area with a roller or cultipacker.

Mulching

Mulch should be used in all permanently seeded areas to retain soil moisture and reduce erosion during establishment of vegetation. The mulch should be applied evenly in such a manner that it provides a minimum of 75% coverage. Typical mulch applications include straw, wood chips, bark, wood fibers, compost much or hydro-mulches. The most commonly accepted mulch used in conjunction with temporary seeding is small grain straw. This straw should be dry and free from mold damage and noxious weeds. The straw may need to be anchored with netting or emulsions to prevent it from being blown or washed away. The straw mulch may be applied by hand or machine at the rate 1.5 - 2 tons per acre (90 pounds per 1000 square feet). Frequent inspections are necessary to check that conditions for growth are good.

Irrigation

Seeded areas should be kept adequately moist. Irrigate the seeded area if normal rainfall is not adequate for the germination and growth of seedlings. Water seeded areas at controlled rates that are less than the rate at which the soil can absorb water to prevent runoff. Runoff of irrigation water wastes water and can cause erosion.

Re-seeding

Areas where the plants do not grow quickly, thick enough, or adequately to prevent erosion should be re-seeded with temporary grasses as soon as such areas are identified.

Table 3.12 Temporary vegetation schedule

Species	Rates (lbs/acre)	Optimum Plant Dates to	Remarks
Browntop Millet (Alone)	40	April 20 - August 15	Quick, Dense Cover
Browntop Millet (Mix)*	10	April 20 - August 15	Quick, Dense Cover
Rye Grain (Alone)	56	February - March, August 15 - November 20	Quick Cover

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Rye Grain (Mix)*	10	February - March, August 15 - November 20	Quick Cover
Rye Grass (Alone)	50	August 10 - October 10	Competitive, Dense
Rye Grass (Mix)*	8	August 10 - October 10	Competitive, Dense

* For details on mixes consult the Lexington Soil and Water Conservation District, (803) 359-3165 ext. 3.

Table 3.13 Temporary vegetation for steep slopes/cut slopes

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Weeping Lovegrass (Alone)	4	April - July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps
Weeping Lovegrass (Mix)*	2	April - July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps

* For details on mixes consult the Lexington Soil and Water Conservation District, (803) 359-3165 ext. 3.

3.5.1.5 Permanent vegetation

Plant Selection

Plant seed selection should be based on the type of soil, the season of the year in which the planting is to be done, and the needs and desires of the permanent land user. Tables 3.14 and 3.15 should be used to select the desired species to be planted. Failure to carefully follow agronomic recommendations often result in an inadequate stand of permanent vegetation that provides little or no erosion control. The rates in Tables 3.14 and 3.15 are based on purity and germination standards required for certification.

The following notes apply to Tables 3.14 and 3.15.

1. In mixtures with temporary cover, the full seeding rate of permanent cover shall be used.
2. Mix means 2 or more long term species plus short term species. For dates other than optimum, call the Lexington Soil and Water Conservation District, (803) 359-3165 ext. 3.

3. A legume, such as a clover, crown vetch, and sericea should be used where it is possible.
4. The appropriate inoculants should be used.

Topsoil

If the surface soil of the seedbed is not adequate for plant growth, topsoil should be applied.

Tillage

If the area has been recently plowed, no tillage is required other than raking or Surface Roughening to break any crust that has formed and to leave a textured surface. If the soil is compacted less than 6-inches, it should be disked for optimal germination. If the soil is compacted more than 6-inches, it should be sub-soiled and disked.

Soil Testing

Information and test provider is available from the PW/SWD and the Soil and Water Conservation District Office.

Lime

Unless a specific soil test indicates otherwise, apply 1½ tons of ground course textured agricultural limestone per acre (70 pounds per 1000 square feet).

Fertilizer

A minimum of 1000 pounds per acre of a complete 10-10-10 fertilizer (23 pounds per 1000 square feet) or equivalent should be applied during permanent seeding of grasses unless a soil test indicates a different requirement. Fertilizer and lime (if used) should be incorporated into the top 4-6 inches of the soil by disking or other means where conditions allow. Do not mix the lime and the fertilizer prior to the field application.

Seeding

The surface of the soil should be loosened just before broadcasting the seed. Seed should be evenly applied by the most convenient method available for the type of seed to be applied. Typical application methods include but are not limited to cyclone seeders, rotary spreaders, drop spreaders, broadcast spreaders, hand spreaders, cultipacker seeder, and hydro-seeders. Cover applied seed by raking or dragging a chain or brush mat, and then lightly firm the area with a roller or cultipacker. Do not roll seed that is applied with a hydro-seeder and hydro-mulch.

Mulching

All permanent seeded areas should be covered with mulch immediately upon completion of the seeding application to retain soil moisture and reduce erosion during establishment of vegetation.

The mulch should be applied evenly in such a manner that it provides a minimum of 75% coverage. Typical mulch applications include straw, wood chips, bark, wood fiber, and compost mulch. The most commonly accepted mulch used in conjunction with permanent seeding is small grain straw. This straw should be dry and free from mold damage and noxious weeds. The straw may need to be anchored with netting or asphalt emulsions to prevent it from being blown or washed away. The straw mulch may be applied by hand or machine at the rate 2 tons per acre (90 pounds per 1000 square feet). Frequent inspections are necessary to check that conditions for growth are good.

Irrigation

Permanent seeded areas should be kept adequately moist, especially late in the specific growing season. Irrigate the seeded area if normal rainfall is not adequate for the germination and growth of seedlings. Water seeded areas at controlled rates that are less than the rate at which the soil can absorb water to prevent runoff. Runoff of irrigation water wastes water and can cause erosion.

Re-seeding

Inspect permanently seeded areas for failure, make necessary repairs and re-seed or overseed within the same growing season if possible. If the grass cover is sparse or patchy, re-evaluate the choice of grass and quantities of lime and fertilizer applied. If the permanent seeding has less than 40% cover, have the soil tested to determine any acidity or nutrient deficiency problems.

Final stabilization by permanent seeding of the site requires that it be covered by a 70% coverage rate.

Post-Stabilization

Once areas are stabilized they can be converted to native species or for establishing on non-critical, level sites. Table 3.16 lists some native species of Lexington County that can be used.

Table 3.14 Permanent vegetation schedule

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Bahia Grass (Alone)	40	March 20 - June 15	Slow to become established
Bahia Grass (Mix)*	30	March 20 - June 15	Slow to become established
Bermuda Grass (Hulled) (Alone)	8-12	April - July 15	Quick cover, Sod forming, partial winter kill
Bermuda Grass (Hulled) (Mix)*	4-6	April - July 15	Quick cover, Sod forming, partial winter kill
Fescue, Tall (KY31) Alone	40	August 15 - October	Seldom seeded alone, not for dry or wet sites
Fescue, Tall (KY31) Mix*	20	August 15 -	Seldom seeded alone, not for

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
		October	dry or wet sites
Sericea Lespedeza (Scarified) Alone or Mix*, (Innoculate with EL Innoculant)	40	April - June	Good for slopes, cuts, and fills that require low maintenance
Ladino Clover (Mix* only), (Innoculate with AB Innoculant)	2	August 20 - October	Naturally adds nitrogen

* For details on mixes consult the Lexington Soil and Water Conservation District, (803) 359-3165 ext. 3.

Table 3.15 Permanent vegetation schedule for steep slopes/cut slopes

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Weeping Lovegrass (Alone)	4	April – July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps
Weeping Lovegrass (Mix)*	2	April – July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps
Crownvetch (Mix*) (Innoculate with Type M Innoculant)	8-10	March - April	2 years to establish, no mowing, green all year, 20” maximum height

* For details on mixes consult the Lexington Soil and Water Conservation District, (803) 359-3165 ext. 3.

Table 3.16 Native species that can be used on non-critical, level sites in Lexington County, SC

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Switchgrass (Mix* with Legumes)	10, PLS**	February 10 – April 20	Mix with Serecia at 30 lbs/acre
Indian Grass (Mix)*	8, PLS**	February – April 20	Mix with Serecia at 30 lbs/acre
Little Bluestem, (Mix*)	8, PLS**	February 10 – April	

* For details on mixes consult the Lexington Soil and Water Conservation District, (803) 359-3165 ext. 3.

**Pure Live Seed

3.5.2 Design Requirements

3.5.2.1 General Requirements

1. SECP plans shall be developed to achieve an eighty (80) percent sediment trapping efficiency. When a site is denuded of vegetation, the structural and nonstructural SECP measures are designed to trap eighty (80) percent of the total suspended solids (TSS) or 0.5 ML/L peak settleable solids concentration (SSC), whichever is less, that are generated by the site. The design storm event associated with this level of control is the 10-year, 24-hour SCS Type II storm event. Calculations shall be provided to show adherence to this criteria.
2. A sediment basin is required when ten (10) or more acres of disturbed land area drain to a single outlet point. Such basins shall be designed to have a design effluent concentration of 0.5 mg/L peak SSC or 80 percent trapping efficiency, whichever is less. These basins shall be limited to controlling runoff for a maximum of thirty (30) acres. Sediment traps shall not have more than five (5) acres draining to them.

Activities that disturb between one (1) and five (5) acres of land area that do not drain to a single outlet point may incorporate practices other than a sediment basin to achieve an equivalent trapping efficiency.

3. Silt fencing shall be placed at the toe of all fill slopes and soil berms. When used on cleared and/or graded areas silt fence shall not have more than ¼ acre draining per 100 feet of silt fence length. The maximum slope length draining to the fence is 100 feet and the maximum gradient draining to the fence is 2H:1V.
4. The following nonstructural site management practices shall be utilized on the plans where applicable:
 - a. Minimize site disturbance to preserve and maintain existing vegetative cover,
 - b. Limit the number of temporary access points to the site,
 - c. Protect off-site and downstream locations, drainage systems and natural waterways from the impacts of sedimentation and erosion,
 - d. Phase and sequence construction activities to limit the extent and duration of disturbed soil exposure to 10 acres and 14 days, respectively, and
 - e. Implement an ongoing inspection and maintenance plan. Suggested maintenance schedules are given in SCDHEC (2005).
5. Sediment storage volumes shall be calculated for all sediment controls to determine the required clean out frequencies and maintenance schedules. The Universal Soil Loss Equation (USLE) and subsequent modifications or other acceptable methods

that determine sediment yield may be used to predict the required sediment storage volumes for specific sediment control structures.

6. To encourage the development and testing of innovative alternative SECP BMPs, alternative management practices that are not included in the Manual may be allowed upon review and approval by the PW/SWD. To use an alternative BMP, the design professional shall submit substantial evidence that the proposed measure will perform at least equivalent to currently approved BMPs contained in the Manual. Evidence may include, but is not limited to:
 - a. Supporting hydraulic and trapping efficiency calculations.
 - b. Peer-review by a panel of licensed professional engineers.
 - c. Research results as reported in professional journals.
 - d. Manufacturer literature.
7. Detailed SECPs shall comply to the maximum extent practicable with the following specific standards and review criteria:
 - a. Sediment tracking control shall be implemented using stabilized construction entrances that are to be located and utilized at all points of ingress/egress on a construction site. The transfer of soil, mud, and dust onto roads shall be prevented.
 - b. Crossings of waterways during construction should be minimized and must be approved by the PW/SWD and the USACE. Encroachment into stream buffers, riparian areas, and wetlands should be avoided when possible.
 - c. Topsoil shall be stockpiled and preserved from erosion or dispersal both during and after site grading operations when applicable.
 - d. Where construction or land disturbing activities will or have temporarily ceased on any portion of a site, temporary site stabilization measures shall be required as soon as practicable, but no later than fourteen (14) calendar days after the activity has ceased. Hydroseeding as often as possible is encouraged. Stabilization of disturbed areas is one of the best approaches for sediment and erosion control.
 - e. All slopes must be stabilized through grassing, hydroseeding, synthetic or vegetative matting, diversion berms, temporary slope drains, etc. and must be performed within 2 working days after the necessary grading has been achieved.
 - f. Final stabilization of the site shall be required within fourteen (14) calendar days of construction completion. Final stabilization is defined as having a density of 70% density permanent vegetation across 100 percent of the site.

- g. Temporary structural controls installed during construction shall be designed to accomplish maximum stabilization and sediment and erosion control. These structures shall be installed, maintained, and removed according to the specifications set forth in this Manual. Temporary structural controls may be removed after permanent controls have been installed.
 - h. All permanent structural controls, including drainage facilities such as channels, storm drainage inlets, and detention basins, shall be cleaned out as part of the project closeout/Notice of Termination (NOT) process.
 - i. Linear projects (utility lines, road construction, etc.) over, under, or along a waterbody shall include measures and controls which adequately protect the water body from undue impact. Such work shall not be performed without approval from USACE/SCDHEC. In addition, such work should be coordinated with the installation of sediment and erosion control measures so that disruption is minimized. Every effort should be made to install utilities during the initial construction phases. Trench sharing is encouraged to the extent practicable. For all linear projects, where the utility contractor disturbs the site where temporary or permanent vegetation has been established, it shall be the responsibility of the utility contractor to re-vegetate the disturbed area. This shall include compaction within the trenches.
- 8. The grading plan should include the following general measures as a minimum:
 - a. For maintenance purposes, the finished cut and fill slopes to be vegetated with grass and shall not be steeper than 3H:1V. Steeper slopes should be avoided or have adequate walls installed.
 - b. Cuts or fills shall not be closer than twenty (20) feet of property lines as to endanger adjoining property without adequately protecting such properties against erosion, sedimentation, slippage, settlement, subsidence, or other damages.
 - c. Subsurface drainage should be provided in areas having a high water table to intercept seepage that would affect slope stability, bearing strength or create undesirable wetness.
 - d. No fill shall be placed where it can slide or wash onto another property.
 - e. Fill shall not be placed adjacent to channel banks where it can create bank failure, reduce the capacity of the stream, or result in downstream sediment deposition.
 - f. All borrow and disposal areas should be included as part of the grading plan.

- g. Adequate channels should be provided to safely convey increased runoff from the developed area to an adequate outlet without causing significant channel degradation, or increased off-site flooding.
 - h. The site should be graded to direct flows to appropriate controls.
- 9. SECP plan shall have the following information contained within a cohesive, easy to follow organization:
 - a. Location of all sediment and erosion control structures on construction documents,
 - b. Delineation of all buffers, sensitive features (wetlands, streams, ponds, existing stormwater structures, etc.), and potential sediment sources that could affect these areas,
 - c. Installation sequencing and maintenance schedules for all SEPC BMPs during and after construction,
 - d. Provisions to preserve topsoil and limit the amount of total disturbed area,
 - e. Details of site grading,
 - f. Design details and computations for all SEPC structures,
 - g. Protection of all storm drain inlets and outlets,
 - h. For sites which disturb more than five (5) acres, a list or calculation of the trapping efficiency for all SECP BMPs, as applicable,
 - i. For sites which disturb greater than five (5) acres, calculations of required sediment storage volumes for all SECP BMPs, as applicable,
 - j. Explanation of any computer models or software used with summaries and/or notes on the output data,
 - k. Location of temporary and permanent soil disposal areas, haul roads, and construction staging areas to minimize erosion, sediment transport, and disturbance to existing vegetation, and
 - l. All necessary certifications by the person responsible for the activity. This includes the NOI application and maintenance covenants.
 - m. Proper preparation of the SECP and the SWPPP, if necessary, by a registered engineer, landscape architect, Tier B land surveyor, or other qualified Federal Government employee.

3.5.2.2 Design procedures

The design procedures will vary depending on the SECP BMP installed. SCDHEC has two handbooks, the BMP Handbook (SCDHEC 2005) and the Stormwater Management and Sediment Control Handbook (SCDHEC 2003) that provide the procedures and equations needed to design the EPSC BMPs listed in Tables 3.9 – 3.16. Proper design must be complemented with proper installation and routine maintenance in order for BMPs to be effective and adhere to the provisions of this Manual.

3.6 Stormwater Drainage System Design

This section provides the design requirements for various storm drainage/collection system components including:

1. Storm drainage pipes:
 - a. Storm drainage lines shall be staked at each box or at intervals that would be sufficient to check alignment and grade of the construction with the approved plans. The use of lasers to augment control is encouraged.
 - b. The minimum size storm drainage pipe allowable shall be fifteen (15) inches in diameter.
 - c. The minimum allowable slope for storm drainage pipe shall be one-half of one (1) percent (0.005 ft/ft) or a minimum flow velocity of three (3) feet per second at all flow levels. Maximum allowable slope for storm drainage pipe is twenty (20) percent (0.20 ft/ft).
 - d. Side property line drainage ditches shall be piped to the right-of-way at a minimum. Drainage system installation must be such that stormwater discharge is not concentrated on adjacent property owners and the velocities below erodable limits for the soils at the discharge point. At pipe outfalls, this normally requires the use of a rip-rap apron, placed on filter fabric and lightly grouted, for a minimum distance equal to or greater than six (6) pipe diameters.
 - e. Type and class of storm drainage pipe, as well as the construction of pipe culverts, shall be in accordance with Sections 714 and 715 of the SCDOT specifications. The proposed use of any type of storm drainage pipes other than RCP shall be considered on a case by case basis.
 - f. A minimum of one (1) foot of cover shall be provided for RCP storm drainage pipe; for RC and LC/I roads, pipe shall be placed at least six (6) inches below the base course. See Chapter 4 – Road Design for specific information on road classes and other related information.

- g. Storm drainage pipe shall be placed to minimize length running under pavement. Where it is necessary for a pipe to cross the roadway, it preferably shall be placed at a ninety (90) degree angle, and in no case at less than forty-five (45) degrees. All cross lines in the roadway shall be compacted in 12" lifts to 95% Standard Proctor maximum density and to 100% Standard on the last 12".
- h. Any "open" storm drainage cross line pipe shall extend out to the toe of the roadway embankment; in no case will the end of the pipe be within five (5) feet of the roadway shoulder.
- i. Storm drainage pipe discharging into a drainage channel shall intersect the channel in a manner such that the interior angles measured from their centerlines of flow, is greater than, or at most equal to ninety (90) degrees. Rip-rap, or other suitable protection, is required from the outlet point to the bottom of the channel and on the opposite channel bank to prevent scour and erosion.
- j. Storm drainage pipe discharging into a wet pond or lake shall have the discharge invert above the permanent pool elevation. Rip-rap or other energy dissipation structures shall be placed from the outlet point to pool level.
- k. A maintenance access point shall be available within every 300 feet for 15-18" diameter pipe, every 400 feet for 24" pipe, and every 500 feet for larger storm drainage lines.
- l. The 100-year 24-hour storm event shall be used to check all drainage designs for local flooding, and possible flood hazards at adjacent structures and/or property.
- m. Hydraulic grade line and head loss calculations for determining water surface elevations shall be performed for connections to existing systems.
- n. Calculations should be performed for the appropriate design storm event.
- o. For storm drainage systems with less than 10 connections, Manning's Equation shall be acceptable for sizing the capacity of drain pipes for non-submerged conditions where the free water surface elevation is below the crown of the pipes.
- p. Storm drain profile plots should be included in the set of construction plans.
- q. Storm drainage systems shall be designed to convey stormwater runoff by gravity flow unless otherwise approved.

- r. For very flat flow lines, flow velocities shall increase progressively throughout the system. Upper reaches of the pipe system may have flatter slopes than the lower end of the system.
- s. Minimum fill cover on all pipes shall be 1-foot, unless stated otherwise by a pipe manufacturer or the PW/SWD. The maximum cover shall be based on the design loads which are calculated from pipe shape, size, material, and location (See Section 4.0)

2. Culverts:

- a. Proper consideration of inlet and outlet control shall be given in the design of culverts and outlets.
- b. The pipe, appurtenant entrance and outlet structure should properly account for water, bed-load, and floating debris at all stages of flow.
- c. There should be no unnecessary or excessive cause of property damage.
- d. The outlet should be designed to resist undermining and washout.
- e. Culvert selection techniques can range from solving empirical formulas, to using nomographs and charts, to comprehensive mathematical analysis for specific hydraulic conditions. Other widely accepted models may be used, but must be approved by the PW/SWD. Designs shall be based upon SCDOT requirements where applicable.
- f. Additional hydraulic capacity shall be required as necessary to prevent backwater effects that may adversely impact upstream property or structures.
- g. A complete study of culverts and design considerations is provided in USDOT 2001a.

3. Headwalls and Outlets:

All exposed ends of pipes shall be protected by a flared end section (limited to pipes 36" or less in diameter) or one of the following type headwalls:

- a. A concrete or brick headwall plastered with grout is preferred; it is required on culvert ends located in major drainage channels as previously defined. An acceptable design detail is provided in Appendix I.
- b. A rip-rap headwall is acceptable for pipes 24" or less in a number of situations. If used, it should conform to the standard details provided in Appendix I. Note that this technique requires the use of both filter fabric and grout.

- c. Outfalls must discharge through a natural buffer area a minimum of fifty (50) feet in width from the property line and must go through some type of energy dissipater to slow the velocity of water.
 - d. Outlets will not be allowed to discharge on fill slopes.
4. Energy Dissipation:
- a. All outlets should be sufficiently stabilized. Calculations shall be provided justifying the design and material used (e.g. riprap aprons geometry and diameter).
 - b. If riprap aprons are used, filter fabric is to be installed beneath all riprap.
 - c. Level spreaders, plunge pools, etc. shall be properly designed and installed at the proposed outlet(s).
5. Catch basins, yard inlets, manholes, and junction boxes:
- a. Materials and construction shall be as specified in Section 719 of the SCDOT specifications.
 - b. Side inlet catch basins or junction boxes (see details in Appendix I) with concrete covers shall have a metal ring and manhole lid cast within the top for easy access (e.g. pull holes in lid).
 - c. When the depth of a catch basin or junction box exceeds four (4) feet, rungs/steps shall be provided for ascent and descent (Steps are to be ASTM-C-478, or equivalent).
 - d. The box top shall be a minimum of three (3) feet by three (3) feet. Sides shall be plastered with grout.
 - e. All pipes entering or leaving shall not protrude more than four (4) inches into the box.
- All roadway catch basins shall be Modified Florida Type Catch Basins, with details as shown in Appendix I.
- f. Yard inlets shall be designed to accommodate a given flow such that ponded water is removed within 24 hours, does not cause flooding to adjacent buildings or other interests. As long as these criterion are met, the depth of ponded water is allowed to exceed the top of the manhole lid by no more than 6 inches for the appropriate design storm.
 - g. It is desirable to locate catch basins outside curve radii. If this is not reasonably possible, the catch basin shall be set back an extra foot and the face of the catch basin shall be parallel to a chord joining the two points on

the curve radius located by projecting lines from the sides of the catch basin box.

- h. Catch basins shall contain a minimum drop of 0.2 feet from invert in to invert out.
- i. Floors are to be of concrete and contain "formed troughs" to help channel flow.
- j. Within a catch basin, the elevation at the crown of any inlet pipe shall be equal to or greater than the crown of the outlet pipe.
- k. Catch basins shall be field staked to ensure proper catch basin inlet alignment with the street gutter line.
- l. Area around all catch basins shall be backfilled in 12" lifts, compacted to 95% Standard Proctor maximum density.
- m. Inlet protection shall be provided at all inlets into the stormwater system during construction and until project closure procedures have been completed or notification from the PW/SWD has been given stating that an acceptable level of stabilization has been achieved. Guidance on design, installation and maintenance of inlet protection can be found in SCDOT (2005).
- n. Inlet spacing shall be based partly on the maximum spread of water into the road way. For the appropriate design storm, at least one full travel lane width must be available during the rain event for all residential collector (RC) and light commercial/industrial (LC/I) roads. Only ½ of a travel lane is necessary for residential/local (RL) road. Inlets upgrade of a road intersection, sag inlets, or the last inlet for a given system must be designed with sufficient capacity to handle the entire flow, such that there is no flow through/bypass.
- o. Maximum depth in which the water may pond above or around an inlet must not threaten surrounding permanent structures or facilities including vehicular or pedestrian traffic.
- p. Inlets placed in roadway gutter lines must be spaced to prevent flow from entering road intersections and to not exceed a maximum spread of 6-feet, or one-half of a travel lane, whichever is greater, and based on maximum inlet capacity.
- q. In depth design procedures for inlet and storm sewer design may be found in AASHTO (1999), USDT (2001b), Mays, L., (2001), and Yen (2001).
- r. All manhole lids and catch basins shall contain the Lexington County water quality logo. Contact the PW/SWD for information on how to obtain lids.

6. Detention/Retention Structures:

- a. A pond's outside toe of slope shall be no closer than 20' from property boundary. Natural areas surrounding the outlet of the pond shall not be impacted by stormwater discharges.
- b. All ponds shall have an emergency spillway designed to hold and safely pass the 100-year storm event. Earthen emergency spillways shall be designed so as not to overtop during the 25-year storm event. Larger ponds which fall under the purview of the Dams and Reservoirs Safety Act must comply with those regulations.
- c. Ponds shall have a six (6) feet tall security fence around the perimeter of the pond parcel. The PW/SWD may relax this requirement if the pond is to be privately maintained.
- d. Underground detention facilities shall be designed to account for periodic maintenance and in accordance with manufacturer recommendations.
- e. Any development that uses a parking area or other feature for detention storage capacity shall clearly identify the limits and depths of the expected detention pool.
- f. Basin configurations which create stagnant water conditions are to be avoided.
- g. Ponds with vegetated embankments shall be less than 15-feet in height and shall have side slopes no steeper than 3H:1V. Embankments protected with erosion control blankets or turf reinforcement matting shall be no steeper than 2H:1V. Geotechnical slope stability analysis is required for slopes greater than 10-feet in height and embankments that have steeper slope than those indicated above. Access inside a pond shall be provided with at least one side slope at 3H:1V or flatter.
- h. A minimum freeboard of 1-foot above the 100-year 24-hour design storm high water elevation shall be provided for all impoundments. The SC Dam Safety Act may impose other restrictions and requirements on dam owners. SCDHEC should be contacted for further information.
- i. The bottom of detention structures shall be graded towards the outlet structure(s) to prevent standing water conditions. A minimum 0.5% bottom slope and 3:1 side slope are recommended.
- j. The maximum depth of permanent storage facilities with a permanent pool shall be determined by site conditions, design constraints, and environmental needs. The facility should provide a permanent pool of water with a depth sufficient to discourage weed and mosquito growth without

creating undue potential for anaerobic bottom conditions. A depth of 4- to 8-feet is reasonable unless SCDNR requirements dictate otherwise. Aeration or other means shall be used as necessary to prevent anaerobic conditions (unless used to remove nutrients). SCDNR shall be contacted when aquatic habitat is required.

- k. Infiltration basins. The following other criteria, based primarily on SC Code of Regulation Section 72-307.C requirements, shall be followed in the design of infiltration systems:
 - i. Areas draining to these practices must be stabilized and vegetative filters established prior to runoff entering the system. Infiltration practices shall not be used if a suspended solids filter system does not accompany the practice. If vegetation is the intended filter, there shall be, at least a 20 foot length of vegetative filter prior to stormwater runoff entering the infiltration practice. Forebays or other engineered devices for sediment removal may be prudent;
 - ii. Each system shall be designed to prevent clogging by fine material and for ease of maintenance;
 - iii. The bottom of the infiltration practice shall be at least 0.5 feet above the seasonal high water table, whether perched or regional, determined by direct piezometer measurements which can be demonstrated to be representative of the maximum height of the water table on an annual basis during years of normal precipitation, or by the depth in the soil at which mottling first occurs;
 - iv. The infiltration practice shall be designed to completely drain off water within 72 hours;
 - v. Soils must have adequate permeability to allow water to infiltrate. Infiltration practices are limited to soils having an infiltration rate of least 0.30 inches per hour. If the infiltration rate is greater than 0.3 but less than 2.0 inches/hour, then an underdrain system must be installed. Initial consideration will be based on a review of the appropriate soil survey, and proposed depths of excavation. The soil survey may serve as a basis for rejection. On-site soil borings and textural classifications must be accomplished to verify the actual site and seasonal high water table conditions when infiltration is to be utilized;
 - vi. Infiltration practices greater than three feet deep shall be located at least 25 feet from basement walls;
 - vii. Infiltration practices designed to handle runoff from areas with a high potential for polluting groundwater shall be a minimum of 150 feet from any public or private water supply well;

- viii. The design of an infiltration practice shall provide a properly sized overflow or bypass for larger storm events. Measures to provide a non-erosive velocity of flow along its length and at the outfall shall also be included as necessary. Additional control devices will typically be necessary prior to a release to a watercourse to meet water quality requirements;
- ix. The slope of the bottom of the infiltration practice shall not exceed five percent. Also, the practice shall not be installed in fill material as piping along the fill/natural ground interface may cause slope failure;
- x. An infiltration practice shall not be installed on or atop a slope whose natural or existing angle of incline exceeds 20 percent.
- xi. If an underdrain system is required, clean outs will be provided at a minimum, every 100 feet along the infiltration practice to allow for access and maintenance.
- xii. In cases where such criteria or limitations make the use of infiltration devices inappropriate, but no discharge currently leaves a given site, the runoff volume from the 5-year storm event shall still be detained on the site. The PW/SWD should be contacted for guidance on the appropriate controls to employ and to discuss the feasibility of development.

3.7 Open Channel Hydraulics

Open channels shall include all permanent storm drainage channels including swales and diversions. These storm drainage systems shall be designed based upon the following criteria:

1. All open channels are to be uniform and shall be stabilized to prevent erosion in a manner approved by the PW/SWD. A number of acceptable techniques are shown in the current version of the SCDHEC (2005).
2. The design of open channels shall be based on Manning's Formula where backwater effects from obstructions and/or tailwater is not present. Flow velocities must be non-erosive to soils present or the channel surfaces must be adequately lined, e.g., rip-rap, concrete. All channels in clayey soils shall be limited to a maximum flow velocity of five (5) feet per second. All channels in sandy soils shall be limited to a maximum flow velocity of 2.5 feet per second.
3. The minimum channel grade shall be 0.005 ft/ft, unless supporting calculations show that there will be no pools or standing water areas formed in the channels at smaller slopes.

4. Design conditions can be assumed to be steady, uniform flow.
5. Except for roadside ditches, the side slopes of grassed lined channels without erosion control blankets or turf reinforcement matting shall be no steeper than 3H to 1V.
6. Channels may be designed with multiple stage levels with a low flow section to carry the 2-year storm event and a high flow section to carry storms of larger frequencies.
7. Lexington County allows vegetated channels. Guidance on the design of these type channels can be found in Haan et. al. (1995) or by using computer software that is capable of calculating channel stability and capacity (See Table 3.17).
8. Additional hydraulic capacity may be required to prevent adverse impacts on adjacent property or the existing drainage system(s).

Table 3.17 Maximum permissible velocities for vegetated channels

Cover	Permissible Velocity (ft./sec.)*					
	Erosion Resistant Soils			Easily Eroded Soils		
	% Slope			% Slope		
	0-5	5-10	> 10	0-5	5-10	> 10
Bermuda Grass	8	7	6	6	5	4
Bahia						
Buffalo Grass						
Blue Gamma						
Centipede Grass	7	6	5	5	4	3
Tall Fescue						
Kentucky Bluegrass						
Red Canary Grass						
Grass-legume Mixture	5	4	NR	4	3	NR
Lespedeza Sericea						
Weeping Lovegrass						
Kudzu						
Alfalfa	3.5	NR	NR	2.5	NR	NR
Small Grains						
Temporary Vegetation						

* Allow velocities over 5 ft/sec only where good cover and maintenance will be provided. If poor vegetation exists due to shade, climate, soils or other factors, the permissible velocity shall be reduced by 50 percent.

NR = Not Recommended

Sources: Elementary Soil and Water Engineering, Shwab et. al. and Hann et. al. (1995)

General guidance on open channel design can be found in USDT (1996, 2001).

3.8 Special Protection Areas

In an effort to address some of the most critical water resource problems that exist in the County, Special Protection Areas have been established. Those wishing to develop or redevelop lands within these protected areas will be required to comply with the minimum standards listed in the preceding sections as well as a more stringent set of design criteria detailed below. These generally focus on either a water quantity or a water quality problem. Maps showing these areas are being posted on the County website, <http://www.lex-co.com/GIS/Index.html>. Until such time that maps are made available to the public, the PW/SWD will inform permit applicants on whether or not a proposed project is required to comply with additional design criteria listed in the following sections. The maps are not included in the manual due to expected changes in the designated areas, particularly those associated with TMDLs.

3.8.1 Flooding Problem Areas

Flooding problem areas exist in locations around the County where development densities have increased to the point that stormwater controls have become overwhelmed, or where controls were never adequately designed or installed to control runoff. The lack of maintenance is also suspected to be contributing to some of the frequent flooding. In an effort to relieve existing flooding problems, the following list of design criteria will be required in designated areas. These areas are expected to change with time. The requirement in conjunction with the enforcement of other design criteria listed in the sections above, are expected to assist in reducing these problem areas.

1. The post-development, peak discharge rates is restricted to $\frac{1}{2}$ the pre-development rates for the 2, 5, 10 and 25-year storm events or to the downstream system capacity, whichever is less.
2. The post-development runoff volumes for the 2 and 10-year storm events above the pre-development level shall be stored for a period of 24-hours on average before release.

Additional criteria may be established on a case by case basis.

3.8.2 Areas Associated with TMDLs and Impaired Waterbodies

In conjunction with the NPDES permitting program, SCDHEC, through delegated responsibility from EPA, must identify and mitigate impaired waterbodies. Impaired waterbodies are identified through a monitoring program, the results of which are compared against water quality standards developed to protect designated uses of individual waterbodies. Waterbodies that are not meeting water quality standards cannot be designated as fishing, swimming, recreation, and/or aquatic life areas. In accordance with Section 303 of the Clean Water Act states must release a bi-annual report of impaired waterbodies. Waters listed on the 303(d) list will eventually have a TMDL developed, which represents the daily amount of a particular pollutant that a waterbody can receive and still meet the water quality standard for its designated use(s). An established TMDL in

Lexington County will require that a plan be implemented that uses structural and nonstructural BMPs to reduce the current loading to either a certain total load or by a percentage. The plans to address the TMDLs will contain provisions for both existing and future land uses. In an effort to counter the potential reduction of water quality with new development, the following list of design criteria shall be followed for all project within Special Protection Areas associated with TMDLs. See Appendix F for a map. Those areas affected will change as additional TMDLs are adopted. A more current map may be obtained from the PW/SWD or on the County's webpage.

Section 3.4 contains a list of design procedures to follow.

3.8.3 Lake Murray

Lake Murray is a vital water resource for Lexington County, providing a vast habitat for aquatic life, as well as a drinking source for much of the midlands of South Carolina. Since the 1950s, lakefront property has been developed under the direction of South Carolina Electric & Gas (SCE&G). With this development has come an increased need to address water quality and erosion issues. In an effort to address these issues, a set of criteria listed below, in addition to the requirements detailed in this Manual, will be enforced for all new development and re-development projects on or near Lake Murray. These design requirements shall specifically apply to stormwater runoff from all new development and re-development projects that is discharged directly into the lake or is discharged within 50 feet of the 360' contour and inside the SCE&G Project Boundary Line (PBL).

The specific design requirements are as follows:

1. Water Quality:
 - a. All sites which disturb greater than one acre shall have a permanent water quality BMP in place to treat at least the first 1-inch of runoff from the entire site. This volume shall be held for a minimum period of 24-hours. The 24-hour detention period shall be measured from the centroid of the inflow hydrograph to the centroid of the outflow hydrograph. If an engineered device is to be used, the design of such device shall be based on the flow rate and discharge associated with the design storm listed in the manufacturer's specifications.
 - b. Due to lake boundary topography, it may be impractical to route all impervious areas to a water quality BMP. In such cases, exemptions for roof area and sidewalks may be allowed. However, the water quality volume in the BMP must reflect that from the entire site (i.e. greater than 1-inch will be treated from other impervious areas). In no cases are roads and parking areas exempt.
 - c. A pretreatment device such as a forebay or vault, to remove debris and large sediments shall be constructed either as part of the water quality BMP or as a separate device.

- d. Developments with a commercial land use or a parking lot which exceeds 2,000 ft² must include the ability to capture hydrocarbons either in pretreatment or in the main BMP(s).
2. Erosion Prevention:

All discharge points shall include energy dissipation features which reduce velocity to a non-erosive state. The use of level spreaders to dissipate energy and create a sheetflow discharge pattern is preferred over a single, large discharge pipe/channel. All energy dissipation measures shall be installed above the 360' contour.

3.9 Stormwater Credits

3.9.1 Natural Area Conservation Credit

Conservation areas protect natural resources and environmental features and help maintain the pre-development hydrology of a site by reducing runoff, promoting infiltration and preventing soil erosion.

A natural area conservation credit is given when areas are left undisturbed on a development site. Natural area conservation credits serve as a benefit to those who must leave a water quality buffer and as an incentive to preserve open space. Examples of natural area conservation areas include:

- forest retention areas
- non-tidal wetlands and associated buffers
- other lands in protective easement (floodplains, open space, steep slopes, water quality buffers)

These areas must remain in their natural state and be protected against any disturbance during construction and protected from future development in order to receive the natural area conservation credit.

Under the credit, a designer can subtract conservation areas from total site area when computing the water quality volume (WQV) for a BMP (see Section 3.4.3.2).

Example Calculation:

Total Site Area: 38 acres

Natural Conservation Area: 7 acres

WQV=3.16 ac-ft (using calculation shown in 3.4.3.2)

Conservation Area Credit Formula:

$$C_{WQ} = (A_{NA}/A)(WQ_v)$$

Where:

C_{WQ} = Natural Area Credit for Water Quality (ac-ft)

A_{NA} = Natural Conservation Area (acres)

A = Total Site Area (acres)

WQ_v = Original Water Quality Volume (ac-ft)

Plug the site information into your formula: $C_{WQ}(7/38)(3.16) = 0.58 \text{ ac-ft}$

Subtract your calculated credit from your original WQV to determine the volume you must treat.

$$3.16 - 0.58 = 2.58 \text{ ac-ft}$$

CHAPTER 4 - ROAD DESIGN

4.1 General

The design criteria in this chapter pertain to roads that are going to be maintained by Lexington County. All Lexington County roads shall be constructed in accordance to the South Carolina Department of Transportation (SCDOT) specifications, or as otherwise specified in this Manual. Paving and proof rolling of roads are to be pre-scheduled with Lexington County inspectors or an independent laboratory approved by Lexington County. A service life of twenty (20) years is expected for new roads with minimum maintenance. All new roads shall have a warranty/guarantee to the design and performance of the streets and storm drainage system, to the satisfaction of the Public Works Stormwater Division (PW/SWD), for a period of two (2) year after the final plat approval.

4.1.1 Classification

Design guidelines are provided for the following road categories: residential/local (RL), residential collector (RC), and light commercial/industrial (LC/I). The design for arterials and other type roads, such as private alleys, which don't fit into one of these three categories, must be approved by the PW/SWD on a case by case basis; design for other roads should be based on the expected traffic load and a complete soils report. A collector (RC) or commercial/industrial (LC/I) classified road cannot empty into a lesser category road, such as residential local (RL).

4.1.2 Average Daily Traffic (ADT)

ADT for residential roads can be estimated using the projected generation rates per dwelling unit shown in Table 4.1.

Table 4.1: ADT Generation

Dwelling Unit	ADT Rate
Single-family detached	10.0
Duplex (twin), Multiplex, Townhouse, etc	8.1
Planned Unit Development	7.8
Apartment, Mobile Home	5.4
Retirement Village	3.3

ADT "break points": 2000 ADT (e.g., 200 single-family detached units) is the break point from RL to RC roads. 4000 ADT is the break point from RC to arterial roads. Road classification for engineering may differ from zoning road classifications.

4.1.3 Design for Road Cross Section and Related Factors

The developer is given a choice of including or not including a complete soils report and detailed road thickness design as part of his engineering plans and specifications. Appendix I contain standard details for typical road cross sections. Two sets of design criteria are provided in Table 4.2. The first provides required thickness for a submittal without a complete soils report for each road classification. The second column provides the minimum thickness allowable when supported by a complete soils report and a detailed road design for a reduced design criteria CONVINCINGLY SUPPORT the reduced design thickness. (Note: A complete soils report shall include at a minimum, but is not limited to (1) a “CBR” on each soil type and (2) a grain size analysis and “Atterberg Limit” determination for each different soil type).

Table 4.2: Design Thickness (compacted) Criteria

Course	Residential/ Local		Residential Collector		Light Commercial/ Industrial	
	Without soils report	With soils report	Without soils report	With soils report	Without soils report	With soils report
Surface						
Hot Plant Mix	2”	15”	3”	2”	3”	2”
Triple Surface Treatment	SCDHPT specs	SCDHPT specs	SCDHPT specs	SCDHPT specs	SCDHPT specs	SCDHPT specs
Base W/ Plant Mix*	Clay Sand					
Macadam	8”	8/6”	9”	7”	10”	7”
Sand-Clay	10”	10/8”	12”	10”	N/A	N/A
Prepared Subgrade	12”	6”	12”	6”	12”	6”
Full Depth Paving Requirements						
Prepared Subgrade	12”	6”	12”	6”	12”	6”
AC Base Course	3”	2.5”	4”	3”	4”	3”
AC Binder Course	2”	1.75”	3”	2”	3”	2”
AC Surface Course	1.25”	1.25”	1.5”	1.25”	1.5”	1.25”

*Base on subgrade higher value, clay lower value sand.

1. May use soil cement for subgrade or base. Must have a soils engineer design and monitor. Need prior approval from PW/SWD.

2. Lexington County may require the developer or contractor to provide up to three (3) corings per development and/or at least one (1) per 300 feet of road whichever is greater.
3. Placement of binder course should immediately follow placement of black base (within 24 hours) and no traffic shall be permitted on the black base.
4. Sand-clay base must meet the minimum requirements for SCDOT base material. Developer shall have the pit pre-approved by a soils engineer and then tested again after in place on site.
5. Full depth asphalt (minimum 6") must be placed from right of way to any existing road.
 - a. All materials used in the base and surface courses must meet all SCDOT Specifications for quality and gradation.
 - b. Triple surface treatment will not be used in conjunction with curbing.
 - c. Must use tacking agent between cold layers of asphalt.
 - d. Must tack between all concrete surfaces and asphalt.
 - e. Must provide positive drainage toward the curb.
 - f. Must tack all soil cement surfaces.

4.1.4 Surfacing

Surface course shall consist of asphaltic concrete Type C (Type I) or triple surface treatment (Type I). Triple surface treatment surface course will only be used on "valley gutter" or "farm to market" roads. Alternative surfaces to be considered on a case by case basis.

4.1.4.1 Weather restrictions

Plant mix base/binder courses may be placed throughout the year as long as the roadway is properly prepared and the surface temperature is at least forty-five (45) degrees and rising. Specific prior approval from the PW/SWD is required before placing AC surface. Triple surface treatment shall only be placed within the time frames specified in the SCDOT Specifications, normally from March 15 to October 15 each year.

4.1.5 Ground water

The seasonal high water table shall be at least thirty-six (36) inches below the base course.

4.1.6 Underdrains

Subsurface drainage is to be provided in areas having a seasonal high water table (particularly in cut areas) to intercept seepage that would affect slope stability, bearing strength or create undesirable wetness. Place underdrain system directly behind the curb of all islands and discharge into drainage box.

4.1.7 Compaction

Compaction shall be required from within the proposed right of ways. All compaction testing whether subgrade, base, utilities shall be inspected by either an independent lab approved by Lexington County or PW/SWD personnel

4.1.7.1 Subgrade

The subgrade shall be compacted to a distance at least eighteen (18) inches outside the back of curbing or the top of the back slope for the valley gutter section. Finished subgrade must meet the same section criteria as the finished base course (proper crown or cross-slope). Subgrade compaction to a minimum of 95% of a standard proctor ASTM-D698. The top 12" of subgrade must be 100% of a standard proctor ASTM-D698.

Proof rolls are required for curbing with a motor grader require a motor grader for road a triaxial dump truck with a minimum of 18 ton loading.

4.1.7.2 Base course

Base course shall be compacted to a minimum of 95% modified proctor ASTM D-1557. Proof rolls are required before the placement of any lift of asphalt.

The base course shall be compacted to a distance at least six (6) inches outside the valley gutter or as shown on the approved typical cross section for other type roadways.

4.1.7.3 Proctors

A minimum of one (1) proctor for the subgrade and one (1) proctor for the base course shall be provided for each different source of material used.

4.1.8 Slopes

Slopes on cuts or fills shall not be steeper than 2:1.

4.2 Patching and cuts of paved areas

When required, these areas shall be cut out in a rectangular shape and following the placement of bedding material (if required), backfilled with stone, compacted in accordance with Section 4.1.7, and a light coat of tack applied around the edges of the cut out area and a surface course of the appropriate thickness placed. Full depth asphalt may be used if compacted accordingly and in two (2) inch lifts.

4.3 Right-Of-Way

4.3.1 Proposed Paved County/Private Roads

The minimum right-of-way for a Lexington County road is fifty (50) feet. This is sufficient for any RL and/or two-lane road with pavement width equal to or less than thirty (30) feet and one which is not reasonably expected to require subsequent widening. A uniform right-of-way width should be maintained on the outside edge of pavement around islands and/or medians and at intersections. A minimum of a sixty-six (66) foot right-of-way is required for any wider or higher order road. Lesser R/W may be used with special criteria using the road design detail shown in Appendix I. If reduced right of way is proposed with additional requirements such as tree planting, sidewalks, and parking areas will be required as per reduced right of way detail.

4.3.2 Existing Paved County Roads

Any development encompassing existing County Roads which do not have the standard fifty (50) foot right-of-way shall dedicate this standard 50 foot width to Lexington County in order to proceed; for tracts lying only on one (1) side of such an existing County Road, a twenty-five (25) foot right-of-way, measured from the existing road centerline shall be dedicated to Lexington County. Proposed road cannot exceed classification of the existing County road.

Requirements for Subdividing Land and Paving Roads on an Existing Non-Paved County Maintained Dirt Road

When subdividing land on an existing County maintained dirt road, the developer must pave the existing dirt road to Lexington County standards when the total (existing and proposed) average daily traffic (ADT) is greater than 300 vehicles per day (vpd). This shall include the entire road frontage of the new subdivision to the nearest paved road intersection.

Additional subdividing on an existing privately maintained dirt road will need to be approved by the Planning Commission subject to Subdivision Regulations. If the existing private road accesses a County maintained dirt road the ADT requirements in Section 4.3.3.1 shall be followed.

When proposing a new private road subdivision accessing a County maintained dirt road the ADT requirements in Section 4.3.3.1, and density requirements in Section 4.3.3.2 shall be followed.

The developer shall be responsible for obtaining all right-of-ways for the road improvements, acquiring off-site easements for storm drainage, and submitting an engineering plan for the road to the PW/SWD for approval. Every attempt must be made to acquire a 50 foot right-of-way. All right-of-way and/or easements shall be obtained prior to issuance of a Land Disturbance Permit.

At the request of the developer, Lexington County will provide the following assistance for a fee:

1. Provide the developer with a petition packet for the road in question. The developer is responsible for securing signatures of all affected property owners on the petition. The petition packet shall contain tax map numbers, property owners, and addresses.
2. Upon a positive response from the above petition, a letter will be sent to all property owners explaining the proposed project and the need for right-of-way and/or storm drainage easements. The letter will ask the recipient to reply to granting a right-of-way and/or storm drainage easements.
3. If an on-site meeting is required, Lexington County will be available to attend as a third party along with the developer and the associated property owners.
4. Evaluate alternative road design.
5. Lexington County will prepare all road right-of-way documents, and associated storm drainage easement documents for the developer to secure notarized signatures from all property owners.

Determination of ADT

Existing ADT shall be determined as follows:

1. If the existing dirt road is a dead end road and has no intersecting roads the existing residences shall be counted and multiplied by a factor of 9.5 (ie $20 \text{ homes} \times 9.5 = 190 \text{ vpd}$ is the existing ADT).
2. If the existing dirt road is a dead end road and has intersecting roads that gain access exclusively by using the existing dirt road, residences on all intersecting roads shall be counted and multiplied by a factor of 9.5 (ie $(20 \text{ homes on dirt road} + 10 \text{ homes on intersecting road} = 30 \text{ homes}) \times 9.5 = 285 \text{ vpd}$ is the existing ADT).
3. If the existing dirt road is a cut through road (a road that terminates at both ends to another road) a traffic study shall be conducted to determine the existing ADT for the dirt road.

The existing ADT on cut through roads may be determined by a traffic study performed by the developer or the PW/SWD will perform the traffic count for a fee.

Total ADT shall be determined as follows:

1. Determine the existing ADT as shown above.
2. Determined proposed ADT from the proposed subdividing (ie number of lots being subdivided x 9.5 = proposed subdividing ADT).
3. Add existing ADT and proposed subdividing ADT for the total ADT.

When an ADT of 300 vpd or greater is reached paving of the dirt road shall be required.

4.3.3.2 Exemptions to Road Paving Requirements based on density

These exemptions shall only apply if the Total ADT is less than 300 vpd.

1. The paving requirement may be exempt for a subdivision if the following density criteria are met:
 - a. On parent parcels of 25 acres or less, a maximum of 10 lots shall be subdivided.
 - b. On parent parcels between 25 and 50 acres “Item a” shall apply, plus one additional lot for every 5 full acres up to 5 lots for a total subdivision of 15 lots.
 - c. On parent parcels between 50 to 100 acres “Item a and b” shall apply, plus one additional lot per every 10 full acres up to 5 lots for a total subdivision of 20 lots.
 - d. On parent parcels greater than 100 acres “Items a, b, and c” shall apply, plus one additional lot for every 15 full acres.
2. Familial subdividing on any size parent parcels will be granted a division of 10 lots and be exempt from the paving requirement. Any further subdividing of these parcels are not exempt from the above requirements. Familial subdividing shall require right-of-way and/or storm drainage easements and all pertinent requirements for platting.

4.3.4 Cul-de-sacs

Minimum right-of-way radius for a cul-de-sac is fifty (50) feet. If a uniform right-of-way is not maintained around the cul-de-sac, there must be a smooth transition joining the different widths and the minimum right-of-way outside the edge of pavement at any point shall be ten (10) feet. Temporary cul-de-sacs shall not be designed/approved on engineered drawings.

4.3.5 Staking

Street right-of-way shall be staked at intervals that are sufficient to check alignment and grade of the construction with the approved plans. Each stake shall display station number and cut or fill

information. Maximum staking interval (preferably each side of the right-of-way) shall be one hundred (100) feet. Staking in curved areas shall be at fifty (50) foot intervals.

4.3.6 Irrigation

No irrigation system is to be installed in the right-of-way by the developer, builder, or homeowner.

4.4 Additional Design Criteria

Table 4.3: Additional Design Criteria

Design Criteria	Residential/ Local	Residential Collector	Light Commercial/ Industrial
Design Speed (mph)	30	40	50
Maximum stopping Distance (ft)	200	300	300
Maximum Grade (%)	15	12	12
Minimum Grade (%)	0.5	0.5	0.5
Minimum Tangent b/t reversing curves (ft)	50	100	100
Curb Types			
B-Barrier	OK	K	OK
R- Rolled	OK	OK	OK
VG – Valley Gutter	OK	NA	NA
None	OK	NA	NA
Pavement Width			
With Barrier curbing (ft)	25	27	27
With Rolled curbing (ft)	25	36	36
With Valley Gutter curbing (ft)	28	36	NA

Design Criteria	Residential/ Local	Residential Collector	Light Commercial/ Industrial
With no curbing (ft)	22	36	NA

1. Design speed may be reduced due to topography and reduced stopping sight distance with the approval of the PW/SWD.
2. See Tables 4-4 and 4-5.
3. "Farm to market" roads without curbing is allowed for road design. Lot widths are not specified but shall be reviewed with the PW/SWD as to the minimum allowed per individual project. Road installation shall include paved driveway aprons and pertinent storm drainage pipe. See driveway detail in Appendix I.
4. Measured from back of curbing to back of curbing or from edge of pavement to edge of pavement on roads w/o curbing.

4.4.1 Catch basin locations

Catch basins shall be located outside intersection curve radii. Catch basins should generally be located on the uphill side of intersections to intercept runoff before it gets into the intersection. Catch basins should be located so to not interfere with driveway and island locations.

4.4.2 Water and sewer line locations

Where it is necessary for pipes to cross the roadway, the length of water and sewer lines running under pavement shall be minimized. Utility lines should be placed at a ninety (90) degree angle with the roadway centerline, if possible, but in no case less than forty-five (45) degrees. Manholes and valves shall not be located in the pavement area.

4.4.3 Sidewalks

Sidewalks within the road R.O.W. shall be maintained and designed per ADA specifications. Lexington County shall not be responsible for maintenance of sidewalks.

4.4.4 Dead end streets

All dead end streets shall terminate in a cul-de-sac, "T" or "Y" per details. Any street greater than 2,000 feet shall have an intermediate turnaround.

4.4.5 Street Access

Each residential development with 200 lots shall have two or more access points to roads of equal or higher classification. Commercial development access points shall be restricted per Lexington County zoning and SCDOT. Interconnectivity is highly suggested for commercial design.

4.4.6 Service Restrictions

A residential collector shall not have driveways if the 27 foot roadway is used. If residential access cannot be avoided and/or limited street parking is foreseen, a 36 foot wide roadway with rolled curb shall be provided.

4.4.7 Left Turn Lanes

A residential development with 200 or greater lots shall provide a left turn lane in the existing subdivision. Development less than 200 lots that access an arterial or certain collector roads, a left turn lane must be provided. A smooth transition shall be provided for the turning lane; the turning lane shall have a minimum length of fifty (50) feet. Painted and stippling arrows shall meet SCDOT requirements.

4.4.8 Concrete Keys

A concrete key, twelve (12) inches wide and twelve (12) inches deep, shall be placed at the end of any pavement section expected to be extended by the Developer within seven (7) days of paving. Concrete keys are temporary and shall be removed prior to paving future roads.

4.4.9 Alley Ways

Home Owner's Association (HOA) shall own/maintain alleyways and all pertinent storm drainage systems. Alleyways shall have a minimum twelve (12) foot width and shall ingress/egress onto a public road or shall terminate with an approved cul-de-sac, "Y", or "T". Alleyways shall not be named. Lots with alleyway access must also have a public or private road frontage. The common area for alleyways shall be equal to or greater than the riding surface.

4.4.10 Traffic Impact Study

Developments on State roads shall be coordinated with SCDOT as per their requirements for traffic impact studies. Developments greater than 100 lots on a County road may be required to submit a traffic impact study, and shall be coordinated with PW/SWD. Developments greater than 100 lots on Municipality roads may be required to submit a traffic impact study, and shall be coordinated with that municipality.

4.5 Measuring Sight Distances

The criteria for measuring sight distances are shown in Table 4.4. The site line must remain within all R/Ws.

Table 4.4: Criteria for measuring sight distance

Criteria	Height above Road Surface
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Height of driver's eye	3.5'
Stopping sight distance object	0.5'
Intersection sight distance object	4.25'

Un-posted dirt road sight distance shall be determined with the PW/SWD.

4.6 Intersection Design

Table 4.5: Intersection Design Guidelines

Item	Value
Minimum angle of intersection	75 (90 is preferred)
Maximum grade within tangent length approaching intersection area	5%
Minimum tangent length (to edge of pavement) approaching intersection (each leg)	50' (RL), 100' (RC or LC/I)
Minimum curb radius:	
a. RL to RL	25'
b. RL to RC or LC/I	30'
c. RL to Arterial	50'
c. RC or LC/I to RC or LC/I	50'
d. Entering cul-de-sac	50'
Minimum centerline offset of adjacent intersection:	
a. RL to RL	150'
b. RL to RC or LC/I	175'
c. RC or LC/I to RC or LC/I	200'
d. RL to Arterial	200'

1. A "three-quarter" cul-de-sac ("blow-out") can be used at sharp corners where the minimum horizontal curve radius cannot be met and/or there is no road intersection.

2. At intersections where there is no catch basin at each radius, the engineer shall provide a "blow-up" of the intersection and show spot grades at critical points. Sufficient information should be provided for construction guidance and to show that positive drainage will be achieved.
3. **Intersection Sight Distance.** Minimum intersection sight distance is found by multiplying the speed limit of the road which is being accessed by tan (10), e.g., for a speed limit of 35 MPH--the intersection sight distance is 350 feet. The resulting sight triangles, obtained by measuring from a point fifteen (15) feet from the edge of the pavement of the road being accessed to the points providing the minimum intersection sight distance in each direction, must be kept clear of all vegetation, walls or structures for a height of between two and one-half (2.5) feet and then ten (10) feet for vision of motorists, pedestrians and other users. A sketch of these "sight distance triangles" is shown in Appendix I. The site line must remain within all R/Ws. Dirt roads to use a speed limit of 45 MPH.
4. Proposed road centerlines shall line up with existing road centerlines per Table 4.6.

4.7 Horizontal curves

A horizontal curve will be installed when the roadway alignment has a deflection angle exceeding ten (10) degrees. Minimum radii are shown in table below.

Table 4.6: Minimum Horizontal Curve Radii

ADT	RL	RC or LC/I
1-250	110	175
251-500	150	200
501-750	175	225
751-1000	200	250
1001-2000	200	300
2001+	an	TBD*

* To be determined by the PW/SWD on a case by case basis.

4.8 Superelevation

RL roads do not normally require superelevation. Where superelevation is used on RC or LC/I roads, the maximum cross slope shall be 0.08 foot per foot with adequate length of runoff for design speed.

Table 4.7: Superelevation Runoff

Superelevation Rate, e	Length of Runoff (ft) for Design Speed (mph) of			
	20	30	40	50
0.02	50	100	125	150
0.04	60	100	125	150
0.06	95	110	125	150
0.08	125	145	170	190

4.9 Vertical curves

All changes in vertical grade, where the algebraic difference in grade exceeds two (2) percent, shall be connected by vertical (crest/sag) curves. The minimum length of any vertical curve shall be one hundred (100) feet. Design should be based on the formulas and graphs provided in Appendix I. Shall be less than 100' when intersecting with a SCDOT roadway.

4.10 Road Entrance Islands/Cul-de-sacs

1. The nose of the island shall be located at a distance of twelve (12) feet from the edge of the existing road pavement.
2. There shall be a normal fifteen (15) foot wide pavement section for one way traffic on each side of the entrance island, measured from back of curb BOC to BOC unless there is a turning lane.
3. Vegetation and structures in islands shall not interfere with intersection sight distance requirements. Perpetual maintenance responsibility must be assumed by a private entity.

4. Expulsion type barrier curbing (see detail in Appendix I) is required around the entire circumference of the island. Pavement shall be sloped so runoff is directed away from the island and into the storm drainage system.
5. All islands are required to have French underdrain system. The underdrain is normally located behind the barrier curb for its entire circumference (although on narrow islands, a single drain running the length of the island in the center may suffice) and tied to a storm drainage system (see detail in Appendix I). A solid pipe shall be used under roadways at a depth of three (3) foot.
6. Traffic control signs, as specified by the South Carolina Manual on Uniform Traffic Control Devices may be required. See Section 6 for additional guidance.
7. The island shall end before the location of the planned driveway for the first lot on each side of the island.
8. Gated community shall provide a minimum of 200' of staging road from access to gate.
9. An island is permitted only in a one-way "left offset" or "centered" design (see details in Appendix I). Note that the dimensions shown in the details are minimums.
10. A normal twenty (20) foot wide pavement section for one way traffic on each side of the island, measured from BOC to BOC, is required for a cul-de-sac.
11. Minimum inside curb radius shall be twenty-five (25) feet with a minimum radius of five (5) feet for the nose of the island; minimum outside curb radius shall be forty-five (45) feet with a return radius of fifty (50) feet for a cul-de-sac.
12. Horizontal and vertical alignment of the roadway shall provide the minimum stopping sight distance as determined by the design speed.
13. Traffic Circles/Roundabouts shall be allowed as shown in standard details provided in Appendix I.

4.11 Traffic, Regulatory, and Street Signage

1. Lexington County shall be responsible for the procurement and installation of all traffic control, regulatory, and street signs, except in those cases where the developer obtains approval from the PW/SWD to use customized signs.

Note: Custom signs, designed to accentuate a development "theme" may be approved on a case to case basis. For developments with standard signage, the developer shall pay the calculated "signage fee". Contact the PW/SWD for the fee schedule.

2. Street names and signs. A street name and appropriate signs shall be provided for each publicity maintained road in Lexington County and for any private road which accesses three (3) or more property owners – providing the property is not accessible from any other road.
 - a. Duplication of any existing name will not be allowed, in part or as a whole. This includes one of two or more words pronounced alike but different in meaning and spelling.
 - b. The requested name shall consist of no more than thirteen (13) letters, and/or spaces (not including the suffix).
 - c. Any long road with several intersecting streets shall only have one name.
 - d. Dead end roads shall have a suffix of “Court”, “Lane or “Place” so as not to be misleading to an emergency vehicle looking for a cut-through to another street.
 - e. Streets having suffixes of “Circle must have two (2) intersections with other streets.
 - f. Abbreviations will not be allowed.
3. Standard Assemblies.
 - a. General - The sign assembly shall consist of two (2) double faced street signs mounted on a two and one-half (2 ½”) O.D. galvanized steel round post. One (1) assembly will be required for T-Type and Cross-Type Intersections. Include names of both roads at intersection.
 - b. Signs - Each sign plate shall be X-truded 6” x 24”, 30” or 36”. The sign material shall be aluminum 0.080 gauge. Background facings for the signs shall be No. 2277 Green Scotchlite™ Reflectorized Sheeting or Equivalent and shall cover the entire sign. The street name legend shall be made with 4” Series “C” letters. The designation of Avenue, Street, Road, Drive, etc., shall be abbreviated and shall be made with 2” Series “C” letters. Periods will not be used after the abbreviations. Painted and/or beaded signs will not be acceptable.
 - c. Posts - The sign posts shall be Schedule 40, 2 ½” O.D. wall thickness 0.156 inches, galvanized steel pipe no less that 10’ in length.
 - d. Brackets - The brackets shall be cast aluminum and in two (2) parts, a cap and a spacer. The cap shall fit over the top of the pipe and have a slot in its top to hold the Street Name Sign. The spacer shall be made with two (2)

slots at 90 degrees to each other to fit over one Street Name Sign and to hold the other. The bracket parts shall be provided with Allen Head Set Screws to hold the entire assembly together on the post.

e. Installation

- i. Each installation shall consist of two (2) double faced street name signs mounted one above the other on top of a 2 ½" O. D. galvanized steel pipe.
- ii. Cross-type and T-type intersection shall have one (1) sign assembly. Where the intersection has more than four (4) street legs, more than one (1) sign assembly will be required.
- iii. The installation shall not be closer to the edge of the pavement than six (6) feet nor more than twelve (12) feet from the pavement edge.
- iv. The bottom of the signs shall be seven (7) feet above the center line finished grade of the street.
- v. The two and one-half (2.5) inch galvanized steel post shall be encased in concrete for a distance of three (3) inches, completely around it and for a depth of eighteen (18) inches below ground.

4. Custom Signs - The dimensions and readability for custom signs must equal or exceed those specified for "standard" assemblies. Installation shall be consistent with that described above for "standard" assemblies.

5. Traffic Control and Regulatory Signs. (Note: Size, shape, and color of "customized" traffic control and/or regulatory signs cannot be modified from that shown in the South Carolina Manual on Uniform Traffic Control Devices.)

a. Placement /Location.

- i. Standardization of position cannot always be attained in practice; however, the general rule is to locate signs on the right hand side of the roadway, where the driver is most likely to look for them. The sign assembly shall be placed not less than three (3') feet, but not more than six (6') feet from the traveled way. The clearance from the bottom of the sign to the ground shall be five (5') feet. Posts are to be two (2) pounds per foot, painted "U" Type Channels.
- ii. If there is any question about placement/location, the PW/SWD will determine location.
- iii. For "customized" signage, the proposed traffic control and street sign locations shall be submitted as a part of the engineering plans.

b. Traffic Control Sign Standards.

- i. The sign assembly shall consist of a sign and a post. The sign shall meet the standard requirement of the South Carolina Department of Highways and Public Transportation standards for size and shape. (They are found in the Manual for Uniform Traffic Control Devices.) The sign shall be covered with engineer grade Scotchlite™ reflective sheeting or equivalent. Standard signs are to be of metal construction and at least .080 gauge thickness. Signs are to be erected on posts no less than ten (10') feet in length.
- ii. Sign posts and their foundations and sign mountings shall be constructed so as to hold signs in a proper and permanent position, to resist swaying in the wind or displacement by acts of vandalism.

c. Regulatory Signs

- i. Stop Sign - A "Stop" sign shall be placed at the intersection of two or more roads. The road(s) of less importance shall be the road to stop and yield right-of-way.

Number	Size	Class
R1-1-30	30" x 30"	Local
R1-1-48	48" x 48"	Collector

Background: Red – Reflectorized.

Legend and Borders: White – Reflectorized

- ii. Yield Sign - Use of a "Yield" sign must be approved by the Planning Engineer. Since it does not require all vehicles to stop, it should only be used where visibility of other approaching traffic is good from the approach on which the yield sign is proposed.

Number	Size	Class
R1-2-36	36"x36"x36"	Standard
R1-2-48	48"x48"x48"	Major

Background: White – Reflectorized

Legend and Border: Red – Reflectorized

- d. Warning Signs - Warning signs shall be erected in accordance with the general requirements for sign position. Since warning signs are primarily for the protection of the driver who is unacquainted with the road, it is very important that care be given to their positioning.

- i. Dead End Signs - The “Dead End” sign is intended for use to notify motorists that the road or street terminates some distance beyond the sign. The sign should be located at the last intersection of a public road or street with the dead end street.

The Dead End sign will be used only where the terminus of the dead end road is within approximately 1,000 feet of the intersection. Where the road terminus is greater than 1,000 feet from the intersection, the road will not be considered a dead end road, and the advance warning of its terminus will be given in accordance with the provisions for the Road End warning sign.

The Dead End sign should be erected on the right side of the road or street, approximately 25-50 feet beyond the intersection, and facing traffic entering the dead end road or street.

Number	Size	Class
W14-1-30	30” x 30”	Local

Background: Yellow-Reflectorized
Legend and Border: White

- ii. Road End Signs - The “Road Ends” warning sign is intended for use in advance of the terminus of a road or street except where the terminus is within 1,000 feet of an intersection, in which case a Dead End warning sign should be erected at the intersection and this sign should be omitted. When the Road Ends warning sign is used it should be followed by a Road Ends regulatory sign (F11-5-36), at the terminus of the road or street.

Number	Size	Class
W14-1a-30	30” x 30”	Local

Background: Yellow – Reflectorized
Legend and Border: Black

- iii. Stop Ahead Signs - A “Stop Ahead” sign is intended for use upon approaching a Stop sign that is not visible for sufficient distance to permit the driver to bring his vehicle to a stop at the Stop Sign. Obstruction(s) causing the limited visibility may be permanent or intermittent.

Number	Size	Class
W3-1-36	36” x 36”	Local
W3-1-48	48” x 48”	Collector

Background: Yellow – Reflectorized
Arrow and Border: Black
Symbol: White Border on Red Background – Reflectorized

- iv. Yield Ahead Signs - A “Yield Ahead” sign is intended for use upon approaching a Yield sign that is not visible for sufficient distance to permit the driver to bring his vehicle to a stop at the Yield sign. Obstructions(s) causing the limited visibility may be permanent or intermittent.

Number	Size	Class
W3-2-36	36” x 36”	Local
W3-2-48	48” x 48”	Collector

Background: Yellow – Reflectorized
Arrow and Border: Black
Symbol: White Margin, Red Border on White Background – Reflectorized

- v. Bridge End Markers - “Bridge End” Markers should be used to mark the end of bridges for approaching traffic. On a two-lane roadway one Bridge End Marker should be used on each side of the bridge. On a divided multi-lane roadway, one Bridge End Marker should be used on each side of the approach end of each bridge. On a multi-lane facility where the roadways carrying opposing traffic are separated only by a raised median and only one bridge exists, one Bridge End Marker should be used on the right side of each end of the bridge.

Number	Size	Class
W18-1R-12	12” x 36”	Local
W18-1L-12	12” x 36”	Local

Yellow Stripes – Reflectorized
Alternate Stripes – Black

- vi. Other Warning Signs - Warning signs other than those specified may be required under special conditions. Warning signs should conform with the general specifications for shape, color, and placement of warning signs.

The applications of such signs are sufficiently apparent as to require no detailed specifications. (They are found in The South Carolina Manual For Uniform Traffic Control Devices.)

- vii. Privately Maintained Roads Signs - Privately maintained road signs shall be placed on the end of the street sign or a separate sign/post. Yellow background with black lettering.

CHAPTER 5 INSPECTIONS & ENFORCEMENT

This chapter establishes inspection and enforcement guidelines to be followed for inspections of stormwater management and stormwater quality facilities.

5.1 Stormwater Management Inspector Authority

Public Works Stormwater Division (PW/SWD) Inspectors are authorized by the Lexington County Stormwater Management Ordinance to inspect construction sites and enforce the requirements of this Manual. The inspectors shall be:

1. Authorized to conduct inspections and file reports for periodic inspections as necessary during land disturbing activities to assure compliance with the approved Stormwater Pollution Prevention Plan (SWPPP), Land Disturbance Permit (LDP), construction plans, and/or Lexington County Stormwater Management Ordinance.
2. Authorized to furnish the permit holder or other authorized agent the results of inspection in a timely manner after the completion of each inspection.
3. Authorized to issue a Corrective Order to the permit holder or other authorized agent when any portion of the site work does not comply with the approved SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance. This will be the first and only warning before a Notice of Violations (NOV) is issued.
4. Authorized to issue a NOV, along with proposed penalties, to the permit holder or other authorized agent. This will occur when any portion of the site work does not comply with the approved SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance after action has not been taken to remedy an issued Corrective Order.
5. Authorized to issue a Stop Work Order (SWO) as the result of unsafe conditions, working without a permit, unsatisfactory work or other non-compliance. A SWO will be issued when previous requests by PW/SWD to remedy a situation(s) (Corrective Orders, NOVs, etc.) have not been followed with appropriate and prompt corrective action.
6. Authorized to issue a Civil Citation as a result of unsafe conditions, non-compliance with a SWO, unsatisfactory work, other non-compliance.
7. Authorized to perform a final inspection upon the completion of the stormwater system to determine if the completed work is constructed in accordance with the approved SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance.

8. Authorized to conduct post-construction inspections and file reports for periodic inspections as necessary to assure all permanent maintenance facilities are operating according to the SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance.

5.2 Stormwater Management Inspector Responsibility

PW/SWD Inspectors shall conduct periodic site inspections on all land disturbing activities and sites that have post-development permanent water quality BMP facilities. The permit holder or other authorized agent shall notify the PW/SWD Inspector at least forty-eight (48) hours before the initiation of construction. The permit holder must also notify the PW/SWD Inspector upon project completion when a final inspection shall be conducted to ensure compliance with the approved LDP. PW/SWD Inspectors shall enforce the following inspection items:

1. Ensure that the approved SWPPP, LDP and construction plans are on the project site and being properly followed and implemented.
2. Ensure that active construction sites are inspected for compliance with the approved SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance.
3. Ensure that permanent maintenance is being performed in accordance with the maintenance schedules as approved with the LDP.
4. Provide the permit holder or other authorized agent a written inspection report either by hand delivery, fax or certified letter after inspections where a deficiency was noted. The following items will be noted in the inspection report:
 - a. Date and location of the site inspection,
 - b. Whether the approved SWPPP, LDP and construction plans are on site and have been properly implemented and maintained,
 - c. Deficiencies of the approved SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance, and
 - d. Corrective action to be taken and corresponding date for the action to be completed.
5. Provide the permit holder or other authorized agent a written permanent maintenance inspection report either by hand delivery, fax or certified letter after inspections where a deficiency was noted. The following items will be noted in the inspection report:
 - a. Date and location of the site inspection,

- b. Whether the maintenance activities have been properly implemented and completed,
 - c. Maintenance deficiencies, and
 - d. Corrective action to be taken and corresponding date for the action to be completed.
- 6. Prior to beginning a post-construction inspection of permanent maintenance, PW/SWD Inspectors shall:
 - a. Contact the owner of the facility and notify when an inspection is to be performed. All maintenance inspections shall be conducted at reasonable times. If the owner cannot be contacted, the inspection shall be performed and a report shall be sent to the owner,
 - b. Upon refusal by any property owner to allow an inspector to enter or continue an inspection, the inspector shall terminate the inspection or confine the inspection to areas where no objections are raised. The PW/SWD Inspector shall immediately report the refusal and grounds to the PW/SWD. The PW/SWD shall promptly seek the appropriate compulsory process, and
 - c. Notify the person financially responsible for the land disturbing activities or for permanent maintenance in writing within 3 working days when a violation(s) is observed. Both Corrective Orders and NOVs will include the following information:
 - i. Nature of the violations,
 - ii. Proposed penalty,
 - iii. Required corrective actions, and
 - iv. The time period for adequately correcting the violations.

The inspector also has the freedom to make unscheduled inspections to assure compliance with the plans or agreed to maintenance schedules.

In the case of an immediate threat to life and/or property, or any other emergency the PW/SWD may employ the necessary labor and materials to perform the required work as expeditiously as possible. The owner shall reimburse all costs, including administrative costs, to the PW/SWD associated with correcting the problem.

5.3 Self Inspections

In accordance with NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities, Lexington County Stormwater Management Ordinance and this Manual, contractors and owners are responsible for conducting inspections during and after construction. Specific requirements for these inspections are provided in the following sections.

5.3.1 Inspection During Construction

Inspections shall be conducted for each stormwater management BMP shown on the construction plans in accordance with the NPDES Construction General Permit, as it relates to frequency, qualifications of the inspector, and documentation. Copies of inspection reports must be inserted in the SWPPP and be made available to PW/SWD Inspectors upon request. Copies of these reports, certifications, and other documentations shall be submitted to the PW/SWD in accordance with the NPDES Construction General Permit.

5.3.2 Permanent Structure Maintenance

The purpose of maintenance inspections is to ensure that permanent stormwater management BMPs are working properly and remain functional. In accordance with the maintenance covenant and schedule agreed to by the owner or lessee, all components of the stormwater system shall be maintained. Records of such activities shall be kept for a period of five (5) years and made available upon request by PW/SWD.

5.4 Corrective Orders

The purpose of the Corrective Order is to notify the permit holder or other authorized agent of deficiencies noted during inspections. Corrective Orders shall be submitted in writing, but a verbal notice may be given if it shall result in immediate compliance. In either case, the PW/SWD Inspector shall give written notice to the violator within three (3) working days of the inspection.

Corrective Orders are to be issued when the permit holder or authorized agent is required to make changes to stormwater management controls and procedures that satisfy the stormwater design plans and specifications. The notice shall set forth the nature of the corrections required and the time allotted to make the necessary changes or repairs.

All Corrective Orders shall be noted in the project file. A compliance date and mailing address for sending needed information shall be supplied.

Corrective Orders may be issued in such cases as:

1. Failure to comply with the stormwater design plans. This may include incorrect measurements, improper materials, improper installation and/or failing to follow proper procedures.

2. Failure to properly maintain permanent stormwater structures, including water quality buffers.
3. Failure to comply with deficiencies noted in a final inspection:
 - a. The final inspection shall list all deficiencies that must be corrected before the development project is complete, and
 - b. The final inspection shall provide compliance date, and request a letter of certification or “As-built.” The permit holder or other authorized agent shall contact a PW/SWD Inspector to request a re-inspection after completing the corrections of the initial final inspection.

The primary intent of the Corrective Order is to give a warning and provide a reasonable timeframe for the permit holder to get a problem resolved prior to PW/SWD taking more a drastic action. This due process is not to be a suggestion that may or may not be addressed, but is instead meant to be a fair approach for all parties involved. The template the PW/SWD will use for these instances is provided in Appendix N.

5.5 Notice of Violation and Stop Work Orders

The purpose of issuing Notice of Violations and Stop Work Orders is to gain compliance with Corrective Orders issued and/or gain compliance with the Lexington County Stormwater Management Ordinance.

5.5.1 Issuing Violations

The PW/SWM Inspector shall issue a NOV to a permit holder, contractor, and/or other authorized agent upon findings of non-compliance of the SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance. In most cases, a Corrective Order is used for the first offense. Subsequent non-compliance with the Stormwater Management Ordinance or failure to complete the items on the Corrective Order within a specified time period will result in a Notice of Violation followed by a SWO. The templates the PW/SWD will use for these instances is provided in Appendix N.

For violations that do not involve the safety of life, or an imminent threat of serious damage to the environment and public or private property, NOV's and SWO's may be issued for, but is not limited to, the following:

1. Failure to notify the PW/SWD before beginning work on the next phase of a development project.
 - a. Any work that has been placed without a required inspection approval shall be certified in writing by a registered design professional before the next phase of construction shall begin.

- b. PW/SWD reserves the right to require a PW/SWD Inspector to inspect all facilities that have not been viewed due to the permit holder 's failure to notify the PW/SWD before work began. This is done at the sole expense of the permit holder. Any deficiencies that need to be corrected before work starts again shall be listed and given a compliance date. The permit holder shall be notified to call for future inspections.
 - c. Failure to provide certification for completed stormwater structures. If an engineer's certification or "As-built" is not received by the compliance date as requested by a previously issued Corrective Order, a NOV will be sent requesting the certification from the permit holder or other authorized agent.
- 2. Failure to have work inspected, and approved before continuing work on the project.
- 3. Failure to have sediment and erosion controls in place, improper installation, and/or improper maintenance. If excavation has been initiated and sediment and erosion controls BMPs are not in place, or are not working to protect sediment from the leaving the development site, a NOV shall be sent with a directive to install the BMPs, correct the deficiency immediately or face a SWO for the entire site.
- 4. Construction not in accordance with the approved plans.
 - a. A Corrective Order stating the activities to be corrected, and a compliance date shall be issued.
 - b. If the correction work hasn't been completed by the compliance date, a NOV shall be issued stating:
 - i. Three additional working days are allowed,
 - ii. A Stop Work Order may be issued, and
 - iii. Citations may be issued.
- 5. Working without grading, building, or other applicable permits.
 - a. Stop Work Order shall be issued directing the owner to obtain the required permits, and
 - b. The Stop Work Order shall state that failure to comply may result in the suspension or revocation of any remaining permits issued for the site and/or civil citations being issued.
- 6. Encroachment upon water quality buffer areas during construction.
- 7. Failure to properly maintain permanent stormwater structures, including water quality buffers.

5.6 Working Without a Permit

Any person that proceeds with land disturbing activities on a site that requires a Stormwater Management Plan and/or LDP without first submitting a plan and obtaining a permit shall automatically have a SWO placed on the development. If the SWO is issued for not obtaining a LDP, a \$200 fee will be charged. All review and inspection fees for that project will be double the normal amount of applicable fees. Payment of fees and other applicable penalties must be complete prior to lifting the SWO. The SWO may allow or require correction of violations, but no other project activities may resume until the SWO has been lifted by the PW/SWD.

5.7 Civil Citations

The issuance of Civil Citations by the Inspector may be made for the following situations:

1. When a SWO has been issued, and work continues in defiance of the order.
2. On abandoned sites where no work has been taking place, and continued non-compliance with a NOV may result in the issuance of repeat citations.
3. When repeated, recurring violations take place at the same development site or when repeated recurring violations take place by the same responsible party. Each day that a violation remains uncorrected constitutes a separate applicable violation.

Violations may subject the permit holder to Civil Penalties of not more than \$1,087 for each violation. Each separate day of a violation constitutes a new and separate violation.

Citations shall be hand delivered when possible. When it is not possible, the Citation shall be sent by Certified Mail. Permit Holders, owners, agents, permittees, lessees, builders, contractors, developers, firms, corporations, or partnerships listed on permit application or tax record may be cited under this provision.

5.8 Criminal Penalties

In addition to any applicable civil penalties, any person who negligently, willfully, or intentionally violates any provision of the Stormwater Management Ordinance shall be guilty of a misdemeanor and shall be punished within the jurisdictional limits of the magistrate's court. Each day of a violation shall constitute a new and separate offense.

CHAPTER 6 FLOODPLAIN PROVISIONS

The goal of this section of the Manual is to provide an overview of the requirements and procedures for proposed land development occurring in or altering of the 100-year floodplain (floodplain) and floodway. Development is defined by FEMA as any man-made change to improved or unimproved property including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations. For situations not addressed in this manual, the Lexington County Floodplain Manager may refer to various South Carolina Flood Mitigation Program and FEMA publications, policies and guidelines.

6.1 Statutory Authorization

County: The Legislature of the State of South Carolina has in SC Code of Laws, Title 4, Chapters 9 (Article 1), 25, and 27, and amendments thereto, delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the County Council of Lexington County, South Carolina does ordain as follows:

6.2 Findings of Fact

The Special Flood Hazard Areas of Lexington County are subject to periodic inundation which results in loss of life, property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures of flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

Furthermore, these flood losses are caused by the cumulative effect of obstructions in floodplains causing increases in flood heights and velocities, and by the occupancy in flood hazard areas by uses vulnerable to floods or hazardous to other lands which are inadequately elevated, flood proofed, or otherwise unprotected from flood damages.

6.3 Statement of Purpose and Objectives

It is the purpose of this ordinance to protect human life and health, minimize property damage, and encourage appropriate construction practices to minimize public and private losses due to flood conditions by requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction. Uses of the floodplain which are dangerous to health, safety, and property due to water or erosion hazards, or which increase flood heights, velocities, or erosion are restricted or prohibited. These provisions attempt to control the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of flood waters, and control filling, grading, dredging and other development which may increase flood damage or erosion. Additionally, the ordinance prevents

or regulates the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

The objectives of this ordinance are to protect human life and health, to help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize flood blight areas, and to insure that potential home buyers are notified that property is in a flood area. The provisions of the ordinance are intended to minimize damage to public facilities and utilities such as water and gas mains, electric, telephone, and sewer lines, streets and bridges located in the floodplain, and prolonged business interruptions. Also, an important floodplain management objective of this ordinance is to minimize expenditure of public money for costly flood control projects and rescue and relief efforts associated with flooding.

Floodplains are an important asset to the community. They perform vital natural functions such as temporary storage of floodwaters, moderation of peak flood flows, maintenance of water quality, groundwater recharge, prevention of erosion, habitat for diverse natural wildlife populations, recreational opportunities, and aesthetic quality. These functions are best served if floodplains are kept in their natural state. Wherever possible, the natural characteristics of floodplains and their associated wetlands and water bodies should be preserved and enhanced. Decisions to alter floodplains, especially floodways and stream channels, should be the result of careful planning processes that evaluate resource conditions and human needs.

6.4 Lands to which this Ordinance Applies

This ordinance shall apply to all areas of special flood hazard within the jurisdiction of Lexington County Unincorporated Areas as identified by the Federal Emergency Management Agency in its Flood Insurance Study, dated February 20, 2002 with accompanying maps and other supporting data that are hereby adopted by reference and declared to be a part of this ordinance.

6.5 Warning and Disclaimer of Liability

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering consideration. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazard or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of Lexington County or by any officer or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

6.6 Interpretation

In the interpretation and application of this ordinance all provisions shall be considered as minimum requirements, liberally construed in favor of the governing body, and deemed neither to limit nor repeal any other powers granted under State law. This ordinance is not intended to repeal,

abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and another conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

6.7 Partial Invalidity and Severability

If any part of this Ordinance is declared invalid, the remainder of the Ordinance shall not be affected and shall remain in force.

6.8 Administrative Procedures

1. **Inspections of Work in Progress:** As the work pursuant to a permit progresses, the local administrator shall make as many inspections of the work as may be necessary to ensure that the work is being done according to the provisions of the local ordinance and the terms of the permit. In exercising this power, the administrator has a right, upon presentation of proper credentials, to enter on any premises within the territorial jurisdiction at any reasonable hour for the purposes of inspection or other enforcement action.
2. **Stop-Work Orders:** Whenever a building or part thereof is being constructed, reconstructed, altered, or repaired in violation of this ordinance, the administrator may order the work to be immediately stopped. The stop-work order shall be in writing and directed to the person doing the work. The stop-work order shall state the specific work to be stopped, the specific reasons for the stoppage, and the conditions under which the work may be resumed. Violation of a stop-work order constitutes a misdemeanor.
3. **Revocation of Permits:** The local administrator may revoke and require the return of the development permit by notifying the permit holder in writing, stating the reason for the revocation. Permits shall be revoked for any substantial departure from the approved application, plans, or specifications; for refusal or failure to comply with the requirements of State or local laws; or for false statements or misrepresentations made in securing the permit. Any permit mistakenly issued in violation of an applicable State or local law may also be revoked.
4. **Periodic Inspections:** The local administrator and each member of his inspections department shall have a right, upon presentation of proper credentials, to enter on any premises within the territorial jurisdiction of the department at any reasonable hour for the purposes of inspection or other enforcement action.
5. **Violations to be Corrected:** When the local administrator finds violations of applicable State and local laws, it shall be his duty to notify the owner or occupant of the building of the violation. The owner or occupant shall immediately remedy each of the violations of law on the property he owns.

6. **Actions in Event of Failure to Take Corrective Action:** If the owner of a building or property shall fail to take prompt corrective action, the administrator shall give him written notice, by certified or registered mail to his last known address or by personal service, that:

- a) the building or property is in violation of the Flood Damage Prevention Ordinance,
- b) a hearing will be held before the local administrator at a designated place and time, not later than 10 days after the date of the notice, at which time the owner shall be entitled to be heard in person or by counsel and to present arguments and evidence pertaining to the matter; and,
- c) following the hearing, the local administrator may issue such order to alter, vacate, or demolish the building; or to remove fill as appears appropriate.

7. **Order to Take Corrective Action:** If, upon a hearing held pursuant to the notice prescribed above, the administrator shall find that the building or development is in violation of the Flood Damage Prevention Ordinance, he shall make an order in writing to the owner, requiring the owner to remedy the violation within such period, not less than 60 days, the administrator may prescribe; provided that where the administrator finds that there is imminent danger to life or other property, he may order that corrective action be taken in such lesser period as may be feasible.

8. **Appeal:** Any owner who has received an order to take corrective action may appeal from the order to the local elected governing body by giving notice of appeal in writing to the administrator and the clerk within 10 days following issuance of the final order. In the absence of an appeal, the order of the administrator shall be final. The local governing body shall hear an appeal within a reasonable time and may affirm, modify and affirm, or revoke the order.

9. **Failure to Comply with Order:** If the owner of a building or property fails to comply with an order to take corrective action from which no appeal has been taken, or fails to comply with an order of the governing body following an appeal, he shall be guilty of a misdemeanor and shall be punished in the discretion of the court.

10. **Denial of Flood Insurance under the NFIP:** If a structure is declared in violation of this ordinance and the violation is not remedied then the local administrator shall notify the Federal Emergency Management Agency to initiate a Section 1316 of the National Flood insurance Act of 1968 action against the structure upon the finding that the violator refuses to bring the violation into compliance with the ordinance. Once a violation has been remedied the local

administrator shall notify FEMA of the remedy and ask that the Section 1316 be rescinded.

11. The following documents are incorporated by reference and may be used by the local administrator to provide further guidance and interpretation of this ordinance as found on FEMA's website at www.fema.gov:

1. FEMA 55 Coastal Construction Manual
2. All FEMA Technical Bulletins
3. All FEMA Floodplain Management Bulletins
4. FEMA 348 Protecting Building Utilities from Flood Damage
5. FEMA 499 Home Builder's Guide To Coastal Construction Technical Fact Sheets

6.9 General Standards

Development may not occur in the floodplain where alternative locations exist due to the inherent hazards and risks involved. Before approval for development in the floodplain is given, the applicant shall demonstrate that new structures cannot be located out of the floodplain and that encroachments onto the floodplain are minimized. In all areas of special flood hazard, the following provisions are required:

- a. Anchoring - All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure;
- b. Flood Resistant Materials and Equipment - All new construction and substantial improvements shall be constructed with flood resistant materials and utility equipment resistant to flood damage;
- c. Minimize Flood Damage - All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damages;
- d. Critical Development – All critical type developments, as defined by this Manual, shall be elevated to the 500 year flood elevation or be elevated to the highest known historical flood elevation (where records are available), whichever is greater. If no data exists establishing the 500-year flood elevation or the highest known historical flood elevation, the applicant shall provide a hydrologic and hydraulic engineering analysis that generates 500-year flood elevation data;

- e. Utilities - Electrical, ventilation, plumbing, heating and air conditioning equipment (including ductwork), and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of the base flood plus 2 ft. This requirement does not preclude the installation of outdoor faucets for shower heads, sinks, hoses, etc., as long as cut off devices and back flow devices are installed to prevent contamination to the service components and thereby minimize any flood damages to the building;
- f. Water Supply Systems - All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system;
- g. Sanitary Sewage Systems – New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters; On-site waste disposal systems shall be located and constructed to avoid impairment to or infiltration of floodwaters during flooding;
- h. Gas Or Liquid Storage Tanks – All gas or liquid storage tanks, either located above ground or buried, shall be anchored to prevent flotation or lateral movement resulting from hydrodynamic and hydrostatic loads;
- i. Alteration, Repair, Reconstruction, Or Improvements - Any alteration, repair, reconstruction, or improvement to a structure that is in compliance with the provisions of the Stormwater Management Ordinance and this Manual shall be defined as Development.
- j. American with Disabilities Act (ADA). A building must meet the specific standards for floodplain construction outlined in Section 2 below as well as any applicable ADA requirements. The ADA is not justification for issuing a variance or otherwise waiving these requirements. Also, the cost of improvements required to meet the ADA provisions shall be included in the costs of the improvements for calculating substantial improvement.
- k. Outlet structures and emergency spillways for all controls, other than a retention or detention pond engineered as part of a stormwater system (e.g. flood control structure), that impede, encroach or alter a major drainage channel or floodplain, must be capable of accommodating stormwater runoff from a 100-year storm event based on built-out conditions for the watershed
- l. The risk to developments downstream of any dam in Lexington County shall be determined using a dam breach analysis method and the subsequent inundation zones determined by a dam breach hydrograph and flood routings. If the inundation zone is not available or undefined, a dam breach analysis will be required by the developer. The dam breach analysis method

will be the “Sunny day” failure scenario for complete dam failure while the impoundment level is at the principal spillway crest. The dam breach hydrograph must be developed using BREACH, HEC-HMS or HEC-RAS (unsteady flow), DAMBRK software programs, or an approved equal. Flood routings must be performed using HEC-RAS (unsteady flow), FLDWAV and DAMBRK. The developer shall be responsible for determining the dam breach parameters so a breach outflow hydrograph can be developed and that resultant hydrograph routed downstream through the area of new development. The inundation zones within the new development will be treated as floodways under the Lexington County Stormwater Ordinance and all development in these areas will apply as such. As there are no tangible criteria for the requirement of a dam break analysis each downstream development will have to be determined on a case-by-case basis by the Floodplain Manager and/or the Plan Review Engineer. A preliminary breach routing analysis may be required to determine if the development will be effected by the breach.

- m. All natural channels, creeks or rivers draining more than 300 acres. Encroachment upon these channels and the adjacent overflow land shall be avoided as much as possible. All unavoidable improvements such as culverts or bridges along these channels shall be designed to carry a flow resulting from a one hundred (100) year frequency storm.

If there are no detailed Flood Studies and Base Flood Elevations available in these areas, the applicant shall provide a detailed flood study delineating the 100-year flood plain and the floodway will be shown on the engineering plans and also on the final plat if applicable. In a subdivision, as defined by the Lexington County Subdivision Regulations, the property lines shall stop at the floodway line and the floodway shall be dedicated to Lexington County. In all other development activities, the plan shall identify all drainage ways.

6.10 Specific Standards

In all areas of special flood hazard (Zones A, AE, AH, AO, and A1-30,) where base flood elevation data has been provided, the following provisions are required:

- a. Residential Construction - New construction or substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor, including basement, elevated to at least two (2) feet above the 100-year frequency flood elevation. If a building pad is used, the ground shall be sloped from the pad down to the 100-year frequency flood elevation over a distance of ten or more feet. In addition, all new construction and substantial improvements of residential structures have all mechanical and utility equipment, and air conditioner units, hot water heaters, washers,

dryers, other similar equipment and their operating components, designed and/or elevated, to at least two (2) feet above the 100-year frequency flood elevation, to prevent water from entering or accumulating in its components. Under limited circumstances flood proofing (i.e. placement in water tight cases) may be allowed. No basements are permitted. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with the elevated buildings requirements in Section 2.d.

- b. Non-Residential Construction - New construction or substantial improvement of any commercial, industrial, or non-residential structure (including manufactured homes) shall have the lowest floor elevated no lower than 2 feet above the level of the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with the elevated buildings requirements in Section d.3. No basements are permitted. Structures located in A-zones may be flood proofed in lieu of elevation provided that all areas of the structure below the required elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered, professional engineer or architect shall certify that the standards of this subsection are satisfied. A variance may be considered for wet-flood proofing agricultural structures. Agricultural structures not meeting the wet-flood proofing criteria must meet the non-residential construction standards and all other applicable provisions of this manual. Structures that are flood proofed are required to have an approved maintenance plan. If manual flood proofing devices such as gates are utilized, then the maintenance plan must contain an annual exercise. The floodplain manager must approve the maintenance plan and notification of the annual exercise shall be provided.
- c. Manufactured Homes:
 - i. Manufactured homes that are placed or substantially improved on sites outside a manufactured home park or subdivision, in a new manufactured home park or sub-division, in an expansion to an existing manufactured home park or subdivision, or in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, must be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated no lower than 2 feet above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement;
 - ii. Manufactured homes that are to be placed or substantially

improved on sites in an existing manufactured home park or subdivision that are not subject to the provisions for residential construction in this manual must be elevated so that the lowest floor of the manufactured home is elevated no lower 2 feet than above the base flood elevation, and be securely anchored to an adequately anchored foundation to resist flotation, collapse, and lateral movement;

- iii. Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. For the purpose of this requirement, manufactured homes must be anchored to resist flotation, collapse, or lateral movement in accordance with Section 19-425.39 of the *South Carolina Manufactured Housing Board Regulations*, effective date May 25, 1990, as amended. Additionally, when the elevation requirement would be met by an elevation of the chassis at least 36 inches or less above the grade at the sight, reinforced piers or other foundation elements of at least equivalent strength shall support the chassis. When the elevation of the chassis is above 36 inches in height an engineering certification is required;
- d. Elevated Buildings - New construction or substantial improvements of elevated buildings that include fully enclosed areas that are usable solely for the parking of vehicles, building access, or limited storage in an area other than a basement, and which are subject to flooding shall be designed to preclude finished space and be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.
 - i. Designs for complying with this requirement must either be certified by a professional engineer or architect or meet the following minimum criteria:
 - (1) Provide a minimum of two openings on different walls having a *total net area* of not less than one square inch for every square foot of enclosed area subject to flooding. The total net area is the total area of the opening minus the area of the louvers when open;
 - (2) The bottom of all openings shall be no higher than one foot above grade;
 - (3) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided they permit the automatic flow of floodwaters in both directions;

- (4) Fill placed around foundation walls must be graded so that the enclosed area can drain away from structure.
 - ii. Hazardous Velocities. Hydrodynamic pressure must be considered in the design of any foundation system where velocity waters or the potential for debris flow exists. If flood velocities are excessive (greater than 5 feet per second), foundation systems other than solid foundations walls should be considered so that obstructions to damaging flood flows are minimized;
 - iii. Enclosures below Base Flood Elevation (BFE):
 - (1) Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator);
 - (2) The interior portion of such enclosed area shall not be partitioned or finished into separate rooms, except to enclose a single storage area and must be void of utilities except for essential lighting as required, and cannot be temperature controlled;
 - (3) One wet location switch and/or outlet connected to a ground fault interrupt breaker may be installed below the required lowest floor elevation;
 - (4) All construction materials below the required lowest floor elevation should be of flood resistant materials and shall be constructed with no more than two (2) solid walls.
- e. Floodways - Located within areas of special flood hazard are areas designated as floodways. The floodway is an extremely hazardous area due to the velocity of floodwaters that carry debris and potential projectiles and has erosion potential and may or may not be shown on the Flood Insurance Rate Map. The following provisions shall apply within such areas:
 - i. No encroachments, including fill, new construction, substantial improvements, or other development shall be permitted in the floodway. Floodways may or may not be shown on the Flood Insurance Rate Maps (FIRM). In areas where floodways are not shown on the FIRM maps or stop short of a subject property, the Floodplain Manager will determine the floodway limits. This may be accomplished by extending the limits to the adjacent property, by a study done by the applicant and approved by the Floodplain

Manager, by an existing or new study by the County or by relocating the proposed development sufficiently away from the waterway;

- ii. If part a is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions;
 - iii. Stream crossings for any purpose (i.e. timber harvesting operations), if temporary, shall be permitted in accordance with floodway requirements and the temporary development provisions. Otherwise, the development shall comply with all applicable flood hazard reduction provisions of this section.
 - iv. No manufactured homes shall be permitted, except in an existing manufactured home park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring and the elevation standards are met;
 - v. Permissible uses within floodways may include: general farming, pasture, outdoor plant nurseries, horticulture, forestry, wildlife sanctuary, game farm, and other similar agricultural, wildlife, and related uses. Also, lawns, gardens, play areas, picnic grounds, and hiking and horseback riding trails are acceptable uses, provided that they do not employ structures or fill. Substantial development of a permissible use may require a no-impact certification. The uses listed in this subsection are permissible only if and to the extent that they do not cause any increase in base flood elevations or changes to the floodway configuration;
 - vi. Floodways that are created when converting an Approximate Zone (A) area to a detailed study area (AE) and that are located within new development shall be dedicated to the County via fee-simple or conservation easements;
 - vii. All floodway delineations that are created when converting an Approximate Zone (A) area to a detailed study area (AE) will be based on maximum ½ foot surcharge.
- f. Recreational Vehicles:
- i. A recreational vehicle is ready for highway use if it is:
 - (1) On wheels or jacking system;
 - (2) Attached to the site only by quick-disconnect type utilities

and security devices;

(3) Has no permanently attached additions.

ii. Recreational vehicles placed on sites shall either be:

(1) On site for fewer than 180 consecutive days;

(2) Fully licensed and ready for highway use, or meet the development permit and certification requirements of Stormwater Management Ordinance, general standards outlined in Section 1, and manufacture homes standards in Section 2.c.

6.11 Map Revision Activities

Map Revision Activities – The National Flood Insurance Program requires flood data to be reviewed and approved by FEMA. This ensures that flood maps, studies and other data identified accurately represent flooding conditions such that appropriate floodplain management criteria are based on current data.

Lexington County has determined that it is appropriate to require consideration of future land use conditions when preparing flood insurance studies. Hydraulic modeling shall be prepared using both conditions. The existing conditions model shall be used to modify the current effective FIRM; however, for purposes of Lexington County floodplain management, the County shall use the higher of the two (2) base flood elevations.

The following map change activities are identified:

i. Requirement to Submit Technical Data:

(1) For all development proposals that impact floodway delineations or base flood elevations, the applicant shall ensure that technical data reflecting such changes are submitted to the Lexington County Floodplain Manager. These development proposals include:

(a) Floodway encroachments that increase or decrease base flood elevations or alter floodway boundaries;

(b) Fill sites to be used for the placement of proposed structures where the applicant desires to remove the site from the special flood hazard area;

- (c) Alteration of watercourses that result in a relocation or elimination of the special flood hazard area, including the placement of culverts;
 - (d) Subdivision or large scale development proposals requiring the establishment of base flood elevations.
 - (2) It is the responsibility of the applicant to have technical data prepared in a format required for a Conditional Letter of Map Revision or Letter of Map Revision, and submitted to FEMA. Submittal and processing fees for these map revisions shall also be the responsibility of the applicant;
 - (3) The Floodplain Manager shall require a Conditional Letter of Map Revision meeting the requirements of 44 CFR Part 65 prior to the issuance of a floodplain development permit for:
 - (a) Proposed floodway encroachments that increase the base flood elevation;
 - (b) Proposed development which increases the base flood elevation by more than one foot in areas where FEMA has provided base flood elevations but no floodway.
 - (4) Approvals issued by the Floodplain Manager shall be conditioned upon the applicant obtaining a Conditional Letter of Map Revision from FEMA for any development proposal;
 - (5) Within sixty (60) days of completion of construction, it is the responsibility of the applicant to have technical data and as-built drawings prepared in a format required for a Letter of Map Revision, and submitted to FEMA. Submittal and processing fees for these map revisions shall also be the responsibility of the applicant.
- ii. Floodplain study general criteria - All floodplain studies shall follow the guidelines and procedures as set forth by the National Flood Insurance Program (NFIP) and Lexington County. The general criteria and requirements have been established to help clarify the procedures related to performing floodplain studies in Lexington County are as follows:
- (1) The project must be consistent with applicable State and Federal regulations;

- (2) A professional engineer registered in the State of South Carolina shall prepare all studies;
- (3) All hydraulic computer models acceptable by FEMA for use in floodplain studies can be used;
- (4) The floodplain analysis shall include the 10-, 50-, 100-, and 500-year, 24-hour storm events;
- (5) Hydrologic analyses should utilize projected future land use conditions based on the most updated data within the desired watershed;
- (6) Backwater conditions, local obstructions, bridges, culverts, and stormwater conveyance systems shall be considered;
- (7) Digital data shall have the following characteristics:
 - (a) Horizontal datum: NAD83 (1986) or referenced to the datum contained on the current effective FIRM;
 - (b) Coordinate system: UTM Zone 17;
 - (c) Vertical datum: NAVD29;
 - (d) Units: international feet;
- (8) Data capture methods must result in new data meeting State and FEMA horizontal and vertical accuracy standards. See the current edition of FEMA's "Guidelines and Specifications for Study Contractors" for more information.
- (9) Calculated flood boundaries shall be submitted in a digital format that is compatible with Lexington County's GIS data.
- (10) Submitted information must include:
 - (a) FIRM panel number(s) that cover the project area and their latest date(s) and whether any portion of the project lies within a Special Flood Hazard Area;
 - (b) The application must be signed and stamped by a South Carolina Registered Engineer, Surveyor, or other qualified Federal Government employees and the applicant must sign the application;
 - (c) Hydrologic and hydraulic analyses must be contained in a report describing the study methodology, a listing

of all assumptions (e.g., rationale for Manning's 'n' values, reasons for revising hydrology, source of topographic information and land use), bridge and cross section data, and a brief description of the project;

- (d) All projects being submitted to FEMA must have a completed FEMA MT-1 or MT-2 form as appropriate. These forms can be obtained from the following:

FEMA Region IV
3003 Chamblee Tucker Road
Atlanta, Georgia 30341
(770.220.5400)
www.fema.gov

The South Carolina Department of Natural Resources
Flood Mitigation Program
2221 Devine Street, Suite 222
Columbia, South Carolina 29205
(803.734.9103)

6.12 Accessory Structures

- i. A detached accessory structure or garage which is greater than 500 square feet must comply with the requirements as outlined in FEMA's Technical Bulletin 7-93 *Wet Floodproofing Requirements or be elevated in accordance with Article IV Section B(1) and B (4) or dry flood proofed in accordance with Article IV B (2)*;
- ii. When an accessory structure greater than 500 square feet is to be placed in the floodplain, the following additional criteria shall be met:
 - (1) Accessory structures shall not be used for human habitation (including work, sleeping, living, cooking, or restroom areas);
 - (2) Accessory structures shall be designed to have low flood damage potential;
 - (3) Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters;
 - (4) Accessory structures shall be firmly anchored to prevent

flotation, collapse, or lateral movement of the structure;

- (5) Service facilities such as electrical and heating equipment shall be installed in accordance with Section 1;
- (6) Openings to relieve hydrostatic pressure during a flood shall be provided below base flood elevation in conformance with Section 2.d.

6.12.1 Swimming Pool Utility Equipment Rooms:

If the building cannot be built at or above the BFE, because of functionality of the equipment then a structure to house the utilities for the pool may be built below the BFE with the following provisions:

- i. Meet the requirements for accessory structures;
- ii. The utilities must be anchored to prevent flotation and shall be designed to prevent water from entering or accumulating within the components during conditions of the base flood;
- iii. A variance may be granted to allow wet flood proofing of the structure.

6.12.2 Elevators

- i. Install a float switch system or another system that provides the same level of safety is necessary for all elevators where there is a potential for the elevator cab to descend below the BFE during a flood per FEMA's Technical Bulletin 4-93 Elevator Installation for Buildings Located in Special Flood Hazard Areas;
- ii. All equipment that may have to be installed below the BFE such as counter weight roller guides, compensation cable and pulleys, and oil buffers for traction elevators and the jack assembly for a hydraulic elevator must be constructed using flood-resistant materials where possible per FEMA's Technical Bulletin 4-93 Elevator Installation for Buildings Located in Special Flood Hazard Areas.

6.12.3 Temporary Development

Certain types of structures (e.g. fruit stands, construction site offices, portable toilets, etc.) may be situated temporarily on flood-prone property without having to comply with the elevation or flood proofing criteria,

respectively, provided that the following criteria are met:

- i. All applicants must submit to the floodplain manager, prior to the issuance of the development permit, a written plan for the removal of any temporary structures or development in the event of a hurricane or flash flood warning notification. The plan shall be reviewed and approved in writing, and must include the following information:
 - (1) A specified time period for which the temporary use will be permitted;
 - (2) The name, address and phone number of the individual responsible for the removal of temporary structures or development;
 - (3) The time frame prior to the event at which any structures will be removed (i.e. minimum of 72 hours before landfall of a hurricane which threatens Lexington County or immediately upon flood warning notification);
 - (4) A copy of the contract or other suitable instrument with a trucking company to insure the availability of removal equipment when needed;
 - (5) Designation, accompanied by documentation, of a location outside the floodplain to which any temporary structure will be moved;
 - (6) A determination of permanent structures which would be adversely affected by increased flooding upstream or downstream, and a method for covering this liability, such as a performance bond;
 - (7) A plan to restore the area to its natural condition once the temporary permit expires or the temporary use is terminated, whichever is first.
- ii. The structure is mobile, or can be made so, and is capable of being removed from the site with a maximum of four (4) hours warning;
- iii. The structure will not remain on the property for more than 180 days.

6.13 Fill

An applicant shall demonstrate that fill is the only alternative to raising the building to meet the residential and non-residential construction requirements, and that the amount of fill used will not affect the flood storage capacity or adversely affect adjacent properties. The following provisions shall apply to all fill placed in the special flood hazard area:

- i. Fill may not be placed in wetlands without the required state and federal permits;
- ii. Fill must consist of soil and rock materials only. Landfills, rubble fills, dumps, and sanitary fills are not permitted in the floodplain;
- iii. Fill used to support structures must comply with ASTM Standard D-698, and its suitability to support structures certified by a registered, professional engineer;
- iv. Fill slopes shall be no greater than two horizontal to one vertical. Flatter slopes may be required where velocities may result in erosion;
- v. The use of fill shall not increase flooding or cause drainage problems on neighboring properties;
- vi. Will meet the requirements of FEMA Technical Bulletin 10-01, *Ensuring That Structures Built On Fill In Or Near Special Flood Hazard Areas Are Reasonable Safe From Flooding*.

6.14 Standards for Subdivision Proposals within Special Flood Hazard Areas

- i. All subdivision proposals shall be consistent with the need to minimize flood damage and are subject to all applicable standards in these regulations;
- ii. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
- iii. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage;
- iv. In all areas of special flood hazard where base flood elevation data are not available, the applicant shall provide a hydrologic and hydraulic engineering analysis that generates base flood elevations

and designated floodways for all subdivision proposals and other proposed developments containing at least 50 lots or 5 acres, whichever is less. If the site is less than 1000' to the downstream detailed study area, then BFE and floodway must be established within the subject property and to the limits of the detailed study. If the site is greater than 1,000 feet, but less than 3,000 feet from a downstream detailed study area, then BFEs must be established to the limits of the detailed study area and a floodway must be established within the subject property, only. If the site is greater than 3,000 feet from a detailed study area, then BFEs and a floodway must be established within the subject property, only;

- v. If the areas of special flood hazard is identified as an area of open space and is deeded as such then a hydrologic and hydraulic engineering analysis that generates base flood elevations for the subdivision proposal would not be required;
- vi. The applicant shall meet the requirement to submit technical data to FEMA in Section 2.g. when a hydrologic and hydraulic analysis is completed that generates base flood elevations;

6.14.1 Standards for Streams without Established Base Flood Elevations and/or Floodways

Located within the areas of special flood hazard (Zones A), are small streams where no base flood data has been provided or where no floodways have been identified. The following provisions apply to single lot construction within such areas:

- a. No encroachments, including fill, new construction, substantial improvements or new development shall be permitted within 50 feet of the stream bank unless certification with supporting technical data by a registered, professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge;
- b. If part a is satisfied and base flood elevation data is available from other sources, all new construction and substantial improvements within such areas shall comply with all applicable flood hazard ordinance provisions and shall be elevated or flood proofed in accordance with elevations established in accordance with the Stormwater Management Ordinance;
- c. Data from preliminary, draft, and final Flood Insurance Studies constitutes best available data. Refer to FEMA Floodplain Management Technical Bulletin 1-98 *Use of Flood Insurance Study (FIS) Data as Available Data*. If an appeal is pending on the study in accordance with 44 CFR Ch. 1, Part

67.5 and 67.6, the data does not have to be used;

- d. When base flood elevation data is not available from a federal, State, or other source one of the following methods may be used to determine a BFE. For further information regarding the methods for determining BFEs listed below refer to FEMA's manual *Managing Floodplain Development in Approximate Zone A Areas*:
 - i. Contour Interpolation:
 - (1) Superimpose approximate Zone A boundaries onto a topographic map and estimate a BFE;
 - (2) Add one-half of the contour interval of the topographic map that is used to the BFE.
 - ii. Data Extrapolation - A BFE can be determined if a site within 500 feet upstream of a reach of a stream reach for which a 100-year profile has been computed by detailed methods, and the floodplain and channel bottom slope characteristics are relatively similar to the downstream reaches.

Hydrologic and Hydraulic Calculations - Perform hydrologic and hydraulic calculations to determine BFEs using FEMA approved methods and software.

6.14.2 Standards for Streams with Established Base Flood Elevations but no Floodways

Along rivers and streams where Base Flood Elevation (BFE) data is provided but neither floodway are identified for a Special Flood Hazard Area on the FIRM or in the FIS. The following provision applies within such areas.

No encroachments, including fill, new construction, substantial improvements, or other development, shall be permitted unless certification with supporting technical data by a registered professional engineer is provided demonstrating that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one-half foot at any point within the community.

6.14.3 Standards for Areas of Shallow Flooding (AO Zones)

Located within the areas of special flood hazard, are areas designated as shallow flooding. The following provisions shall apply within such areas:

- a. All new construction and substantial improvements of residential structures

shall have the lowest floor elevated to the depth number specified on the Flood Insurance Rate Map, in feet, above the highest adjacent grade. If no depth number is specified, the lowest floor shall be elevated at least four (4) feet above the highest adjacent grade;

- b. All new construction and substantial improvements of non-residential structures shall:
 - i. Have the lowest floor elevated to the depth number specified on the Flood Insurance Rate Map, in feet, above the highest adjacent grade. If no depth number is specified, the lowest floor shall be elevated at least four (4) feet above the highest adjacent grade;
 - ii. Be completely flood proofed together with attendant utility and sanitary facilities to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

6.15 Historic Structures

Variances may be issued for the repair or rehabilitation of historic structures upon the determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

6.16 Agricultural Structures

Variances may be issued to wet flood proof an agricultural structure in accordance with Technical Bulletin 7-93, *Wet Flood proofing Requirements for Structures Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program*, document number FIA-TB-7, dated 12/93, and available from the Federal Emergency Management Agency. In order to minimize flood damages during the base flood and the threat to public health and safety, the structure must meet the following standards:

- a. Use of the structure must be limited to agricultural purposes as listed below:
 - i. Pole frame buildings with open or closed sides used exclusively for the storage of farm machinery and equipment;
 - ii. Steel grain bins and steel frame corncribs;

- iii. General-purpose barns for the temporary feeding of livestock that are open on at least one side;
 - iv. For livestock confinement buildings, poultry houses, dairy operations, and similar livestock operations, variances may not be issued for structures that were substantially damaged. New construction or substantial improvement of such structures must meet the elevation requirements of Article IV.B.2 of this ordinance;
 - v. Detached garages and storage sheds solely used for parking and limited storage in connection with agricultural uses only, which are no greater than 500 square feet in area.
- b. The agricultural structure must be built or rebuilt, in the case of an existing building that is substantially damaged, with flood-resistant materials for the exterior and interior building components and elements below the base flood elevation;
 - c. The agricultural structure must be adequately anchored to prevent flotation, collapse, or lateral movement. All of the structure's components must be capable of resisting specific flood-related forces including hydrostatic, buoyancy, hydrodynamic, and debris impact forces. Where flood velocities exceed 5 feet per second, fast-flowing floodwaters can exert considerable pressure on the building's enclosure walls or foundation walls;
 - d. The agricultural structure must meet the venting requirement of Section 2 of this ordinance;
 - e. Any mechanical, electrical, or other utility equipment must be located above the base flood elevation so that they are contained within a watertight, flood proofed enclosure that is capable of resisting damage during flood conditions;
 - f. The agricultural structure must comply with the floodway encroachment provisions of this manual;
 - g. Major equipment, machinery, or other contents must be protected. Such protection may include protective watertight flood proofed areas within the building, the use of equipment hoists for readily elevating contents, permanently elevating contents on pedestals or shelves above the base flood elevation, or determining that property owners can safely remove contents without risk to lives and that the contents will be located to a specified site out of the floodplain in accordance with the temporary development provisions of this manual.

6.17 Considerations

In passing upon such applications, the appeal board shall consider all technical evaluations, all relevant factors, all standards specified in other sections of this ordinance, and:

- a. the danger that materials may be swept onto other lands to the injury of others;
- b. the danger to life and property due to flooding or erosion damage, and the safety of access to the property in times of flood for ordinary and emergency vehicles;
- c. the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
- d. the importance of the services provided by the proposed facility to the community;
- e. the necessity to the facility of a waterfront location, where applicable;
- f. the availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;
- g. the compatibility of the proposed use with existing and anticipated development, and the relationship of the proposed use to the comprehensive plan and floodplain management program for that area;
- h. the expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site,
- i. the costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges and,
- j. Agricultural structures must be located in wide, expansive floodplain areas, where no other alternative location for the agricultural structure exists. The applicant must demonstrate that the entire farm acreage, consisting of a contiguous parcel of land on which the structure is to be located, must be in the Special Flood Hazard Area and no other alternative locations for the structure are available.

6.18 Findings

Findings listed above shall be submitted to the appeal board, in writing, and included in the application for a variance. Additionally, comments from the Department of Natural Resources, Land, Water and Conservation Division, State Coordinator's Office, must be taken into account and included in the permit file.

6.19 Floodways

Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result unless a CLOMR is obtained prior to issuance of the variance. In order to insure the project is built in compliance with the CLOMR for which the variance is granted the applicant must provide a bond for 100% of the cost to perform the development.

6.20 Conditions

Upon consideration of the factors listed above and the purposes of this ordinance, the appeal board may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance. The following conditions shall apply to all variances:

- a. Variances may not be issued when the variance will make the structure in violation of other federal, State, or local laws, regulations, or ordinances.
- b. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
- c. Variances shall only be issued upon a showing of good and sufficient cause, a determination that failure to grant the variance would result in exceptional hardship, and a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisance, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
- d. Any applicant to whom a variance is granted shall be given written notice specifying the difference between the base flood elevation and the elevation to which the structure is to be built and a written statement that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation. Such notification shall be maintained with a record of all variance actions.
- e. The local administrator shall maintain the records of all appeal actions and

report any variances to the Federal Emergency Management Agency upon request.

- f. Variances shall not be issued for un-permitted development or other development that is not in compliance with the provisions of this ordinance. Violations must be corrected in accordance with Article III.F.5 of this ordinance.

6.21 Floodplain Management Building Procedures

The following information describes the specific procedures from obtaining a building permit to final inspection for construction in a designated flood area. It is the responsibility of the property owner/contractor to provide this information to the Floodplain Manager if it is determined the property or any part of the property is located in a designated flood area.

REQUIREMENTS FOR CONSTRUCTION IN A DESIGNATED FLOOD AREA

A. Single Family Construction (New Construction) in AE zones with established Base Flood Elevations (BFE'S) including Lake Murray.

If your property is located on Lake Murray or it is determined to have a flood zone touching the property you must have the following:

1. A foundation survey stamped and signed by a South Carolina Registered Land Surveyor. The 100-year flood line must be shown and ground elevations taken at each corner of the house. This must be done with-in 30 days of the approved footing inspection. A hold with be put on the rough-in inspection until this is satisfied.
2. If the **entire** footprint of the house is out of the 100-year flood line **no further flood certification is required.**
3. If the foundation survey determines that the footprint of the house falls within the 100-year flood line the following construction requirements will apply:
 - a. The lowest floor including basement and garage must be elevated at least 2 feet above the designated BFE.

- b. All mechanical, utility, HVAC units and ductwork, hot water heaters, washers, dryers, and all similar equipment and their operating components must be elevated to at least 2 feet above the designated BFE.
- c. Fuel storage tanks located below the BFE must be secured against flotation and lateral movement. This can be accomplished by anchoring the tank with tie down straps or anchor bolts onto a concrete slab or counterweight.
- d. Flood vents must be installed in the foundation based on the following criteria:
 - 1. Provide a minimum of 2 openings having a total area of 1 square inch for every 1 square foot of area subject to flooding.
 - 2. The bottom of openings shall be no higher than 1 foot above grade.
 - 3. Openings may be equipped with screens, louvers, valves or other coverings or devices provided they cannot be closed at any time and permit the automatic flow of floodwater in both directions.
- e. An as-built elevation certificate must be submitted at **finished construction** signed and stamped by a South Carolina Registered Land Surveyor to verify floor elevations, flood vents, and elevation of machinery and equipment.
- f. A site inspection will be performed by the Floodplain Manager to verify the as-built elevation certificate.

B. Residential Additions to any property that has a designated flood zone including Lake Murray.

- 1. Before a building permit may be issued, the applicant must submit a survey with ground elevations taken at the existing residence and ground elevations taken at the proposed corners of the addition.
- 2. If the elevations of the existing residence or proposed addition are above the 100-year Base Flood Elevation (BFE), a hold will be put on the rough-in inspection and the Floodplain Manager will verify the proposed addition based upon the submitted survey. If the addition is built according to the submitted survey the hold will be lifted from the permit.
- 3. If any elevations of the existing residence or proposed addition are below the 100-year Base Flood Elevation the addition will have to be built according to the above specifications for houses located in a flood zone.
- 4. If the addition is deemed to be a **substantial improvement** the **existing residence** will have to be brought into compliance with Lexington County Floodplain Management regulations as well.

C. Single Family Construction in a Zone A (without established base flood elevation)

- 1. A survey must be submitted by a South Carolina Registered Land Surveyor showing the location of the house and the scaled location of the flood line. If the home is located outside the scaled limits of the flood zone, no further flood certification is needed.
- 2. If the home is determined to be inside the flood zone, the flood regulations for single-family construction in AE Zones with designated BFE will apply. The BFE for this

property will be determined by the Lexington County Floodplain Manager or by some other approved method.

D. Mobile Homes

Mobile homes are subject to the same floodplain management regulations as described for single-family construction in flood zones. In addition the mobile home must be anchored to a foundation system to resist flotation, collapse, and lateral movement. Flood vents will be required if the mobile home rests on a solid foundation.

CHAPTER 7 REFERENCES

This chapter lists the various references used in the manual and if available, websites where they can be retrieved.

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